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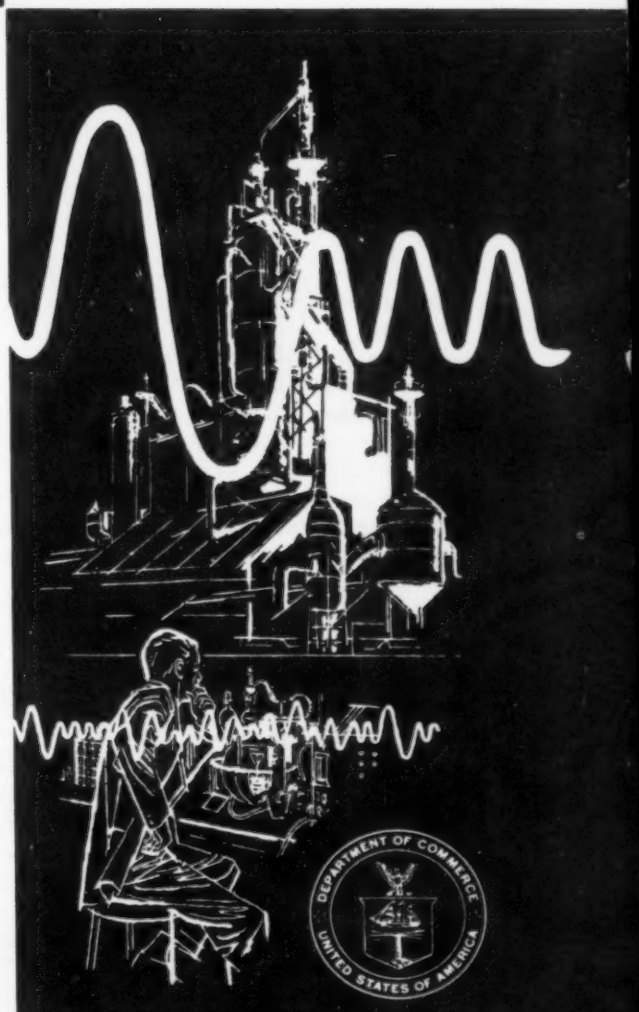

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U.S. DEPARTMENT OF COMMERCE
Luther H. Hodges, *Secretary*

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A BIBLIOGRAPHY OF REPORTS FROM THE BEHAVIORAL SCIENCES LAB., 1955-1962. ENGINEERING PSYCHOLOGY, TRAINING PSYCHOLOGY, ENVIRONMENTAL STRESS, SIMULATION TECHNIQUES, AND PHYSICAL ANTHROPOLOGY. 807 REFERENCES.
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***JET TRANSPORT PLANES**
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***KILL PROBABILITIES**
MATHEMATICAL ANALYSIS

A PRESENTATION IS MADE OF A SYSTEM OF ORDINAR DIFFERENTIAL EQUATIONS WHICH CAN BE SOLVED RECURSIVELY, AND WHOSE SOLUTIONS FURNISH THE VALUES OF THE EXPECTED NUMBER OF TARGETS KILLED AS WELL AS THE OPTIMAL FIRING SCHEDULE.
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*MACHINE TOOLS
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***ORGANIC COATINGS**
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*PARTICLES
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*PATTERN RECOGNITION
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*PATTERN RECOGNITION
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*PERCEPTION
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*PERCEPTION
PERSONALITY

THE MEASUREMENT OF INDIVIDUAL DIFFERENCES IN PERCEIVED PERSONALITY TRAIT RELATIONSHIPS AND THEIR RELATION TO CERTAIN DETERMINANTS.
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*PERCEPTION
SYNTHESIS

CONCEPT INVENTION UNDER VARIOUS CONDITIONS; DETERMINISTIC, EXPECTANCY OF MISINFORMATIVE FEEDBACK, STIMULUS DIVERSITY, AND PROBABILISTIC FEEDBACK.
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*PERCHLORATES
PYROLYSIS

TRANSLATION OF FOREIGN RESEARCH: THERMAL DECOMPOSITION OF NITROSYL PERCHLORATE.
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*PERCHLORATES
THERMODYNAMICS

HEAT OF FORMATION OF TRISETHYLENEDIAMINE COBALT III PERCHLORATE (TFDCP).
AD-401 481 DIV. 4

*PERSONALITY
PERCEPTION

THE MEASUREMENT OF INDIVIDUAL DIFFERENCES IN PERCEIVED PERSONALITY TRAIT RELATIONSHIPS AND THEIR RELATION TO CERTAIN DETERMINANTS.
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*PERTURBATION THEORY

TIME-DEPENDENT PERTURBATION THEORY BY GAUGE TRANSFORMATIONS.
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*PETROLEUM INDUSTRY
PROCESSING

ABSTRACT OF RUSSIAN LITERATURE RELATING TO HYDROGENERATED COAL TAR PRODUCTS AS POSSIBLE CONSTITUENTS OF JET ENGINE FUEL.
AD-401 316 DIV. 10

ABSTRACT OF RUSSIAN ARTICLE ON COMPOSITION OF A CRUDE OIL, A POSSIBLE SOURCE OF T-5 JET FUEL AND OF FRESH OILS TO BE USED IN REFRIGERATION.
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*PH
AMIDES

DISSOCIATION CONSTANTS CONJUGATE ACIDS OF ANILINE, ALPHA-NAPHTHYLAMINE, BETA-NAPTHYLAMINE FROM UV ABSORPTION SPECTRA IN 50% ETHANOL-WATER SOLUTION; RESULTS COMPARED WITH POTENTIOMETRIC MEASUREMENTS.
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*PHARMACOLOGY
NERVOUS SYSTEM

A STUDY OF VARIOUS CHEMICAL COMPOUNDS WITH RESPECT TO MUSCLE RELAXANT PROPERTIES AND EFFECTS ON CENTRAL NERVOUS SYSTEM.
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*PHASE DETECTORS
MICROWAVE EQUIPMENT

A COAXIAL AMPLITUDE-INSENSITIVE PHASE-DETECTION SYSTEM IS DISCUSSED IN DETAIL. A HYBRID JUNCTION IN A BALANCED DETECTOR CONFIGURATION TO RENDER A NULL READING IS USED.
AD-401 892 DIV. 8

*PHASE LOCKED COMMUNICATION SYSTEMS

TECHNIQUES FOR SYNCHRONIZING PULSE-CODE-MODULATED TELEMETRY ARE DISCUSSED.
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*PHASE STUDIES
CAPILLARY TUBES

A STUDY OF THE GAS AND LIQUID PHASES IN HORIZONTAL TUBES OF CAPILLARY DIAMETER.
AD-402 012 DIV. 9

*PHASE STUDIES
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*PHENOLIC PLASTICS
PYROLYSIS

FLASH PYROLYSIS PRODUCTS OF PHENOL-FORMALDEHYDE BY TIME-OF-FLIGHT MASS SPECTROSCOPY.
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*PHOSPHONITRILE CHLORIDES
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PREPARATION THERMOPLASTIC AND THERMOSETTING HEAT-RESISTANT RESINS FROM PHOSPHONITRILIC CHLORIDE TRIMERS SUBSTITUTION OF PHENYL, PHENOXY, ETHOXY, OR DIMETHYLAMINO GROUPS; FOR ELECTRICAL APPLICATION.
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*PHOSPHORESCENT MATERIALS
ELECTROLUMINESCENCE

PHOSPHOR RESEARCH. ZINC-SULFIDE; MANGANESE THIN FILM ELECTROLUMINESCENT CELL CONFIGURATION, CORRELATION BETWEEN ELECTROLUMINESCENCE AND WELL-CRYSTALLIZED, HIGHLY ORIENTED FILM STRUCTURE, VAPOR DEPOSITION PROCESS.
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*PHOTOELECTRIC CELLS (SEMICONDUCTOR)
SILICON

IMPURITY DISTRIBUTION IN ALLOYED LAYER OF PHOTOELECTRIC CONVERTERS. STUDY OF USING POLYCRYSTALLINE SILICON TO MAKE PHOTOELECTRIC CONVERTERS. DESIGNS AND ELECTRICAL CHARACTERISTICS OF SILICON PHOTOELECTRIC CONVERTER BATTERIES. HIGH CONCENTRATIONS OF SOLAR ENERGY IN SILICON PHOTOELECTRIC CELLS. SOLAR PHOTOELECTRIC BATTERY REFLECTORS.
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*PHOTOGRAMMETRY
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ANALYTICAL AERIAL TRIANGULATION ERROR ANALYSIS AND APPLICATION OF COMPENSATING EQUATIONS TO THE GENERAL BLOCK TRIANGULATION AND ADJUSTMENT PROGRAM.
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SCIENTIFIC RESEARCH

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*PILOTS

SYSTEMS ANALYSIS OF LONGITUDINAL PILOTED CONTROL IN CARRIER APPROACH.
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*PILOTS
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*PIPES
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*PLASMA OSCILLATIONS

RELATIVISTIC BEAM OF CHARGED PARTICLES PENETRATING A STATIONARY, QUIESCENT PLASMA AND THE STREAMING INSTABILITY WHICH CAN DISRUPT THE SYSTEM.
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*PLASMA OSCILLATIONS
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NANOSECOND PULSE BREAKDOWN STUDY. A SUMMARY OF MICROWAVE GAS BREAKDOWN THEORY IS PRESENTED.
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MICROWAVE RESEARCH ON TRANSVERSE-WAVE FREQUENCY DOUBLERS, PARAMETRIC REFRIGERATION, OPTICAL MASERS, ACOUSTIC WAVE AMPLIFICATION, FERRITE NONLINEAR PROPAGATION AND PLASMA HARMONIC GENERATION.
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*PLASMA PHYSICS
DIFFRACTION

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*PLASMA PHYSICS
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*PLASMA PHYSICS
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*PLASTICITY
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*PNEUMATIC SYSTEMS

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PNEUMATIC LOGIC ELEMENTS IS DESCRIBED.
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*POLITICAL SCIENCE
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FUTURE NAVY SYSTEMS. VOLUME I INTRODUCTION TO POLITICAL-MILITARY ENVIRONMENT OF WARFARE. AN EXAMINATION OF THE BROAD POLITICAL, MILITARY, AND GEOGRAPHIC BACKGROUND OF WAR TO OBTAIN AN OVERVIEW OF THE GLOBAL ENVIRONMENT THAT DETERMINE MILITARY REQUIREMENTS.
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*POLITICAL SCIENCE
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*POLYESTER PLASTICS
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*POLYESTER PLASTICS
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*POLYMERS
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*POLYNOMIALS

DERIVATION OF APPROXIMATING POLYNOMIALS FOR FUNCTION I=FV IS STUDIED.
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*POLYNOMIALS
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*POPULATION
POLITICAL SCIENCE

FUTURE NAVY SYSTEMS, VOLUME I INTRODUCTION TO POLITICAL-MILITARY ENVIRONMENT OF WARFARE. AN EXAMINATION OF THE BROAD POLITICAL, MILITARY, AND GEOGRAPHIC BACKGROUND OF WAR TO OBTAIN AN OVERVIEW OF THE GLOBAL ENVIRONMENT THAT DETERMINE MILITARY REQUIREMENTS.
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*POSITION FINDING
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*POWER EQUIPMENT
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*POWER SUPPLIES
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FUEL CELLS. MECHANISMS AND CONTROL PARAMETERS OF GAS DIFFUSION ELECTRODES. MATHEMATICAL MODEL FOR MASS TRANSPORT OF A REACTING SPECIES THROUGH A LIQUID TO AN ELECTRODE SURFACE.
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*POWER SUPPLIES
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*POWER SUPPLIES
RADIATION EFFECTS

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*PRESSURE
WELDING

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*PRESSURE GAGES
CALIBRATION

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*PRESSURE GAGES
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*PROBABILITY

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*PRODUCTION
MATHEMATICAL ANALYSIS

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*PRODUCTION
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*PROGRAMMING (COMPUTERS)

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UTILITY SYSTEM PROGRAMMING PROPOSAL: PROPOSAL FOR MODIFYING PREPARE MASTER TAPE II (PMTYI) ROUTINE.
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*PROGRAMMING (COMPUTERS)
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*PROGRAMMING (COMPUTERS)
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TECHNICAL ABSTRACT BULLETIN

1. AIRCRAFT AND FLIGHT EQUIPMENT

AD-401 094 Div. 1, 7
(TISTE/OHD) OTS price $3.60

American Machine and Foundry Co., Alexandria, Va.
SOLID STATE MATRIX.
Quarterly rept. no. 4, 1 Jan-31 Mar 63,
by R. N. Stock and R. W. Powell. 12 Apr 63,
27p. incl. tables.
(Contract AF 33(657)8688, Proj. 8128)
Unclassified report

DESCRIPTORS: *Electronic switches, *Electric switches, *Semiconductor devices, De-icing systems, Electrical equipment, Power equipment, Airborne.

The operation of several circuits was demonstrated and the status, problems, and future plans for the project were thoroughly reviewed. The testing of the dc control section was completed. Then the TR section was constructed and tested. Finally, the experimental anti-ice system was constructed and tested. This completed all testing of the dc power and anti-ice systems. Results were good. The drawing presentation of the solid state systems was improved, and the transient problem was given further attention. (Author)

AD-401 129 Div. 1
(TISTA/GEC) OTS price $10.10

Human Sciences Research Inc., Arlington, Va.
FEASIBILITY FOR RESEARCH APPLICATION OF VISUAL ATTACHMENTS FOR DYNAMIC FLIGHT SIMULATORS REPORT NO. 2: REQUIREMENTS AND STATE-OF-THE-ART EVALUATION,
by John A. Whittenburg and James E. Wise.
Feb 63, 1v. incl. illus. tables (Rept. no. HSR-RR-62/10-Mk-X)
(Contract FAA/BRD-401, Proj. 421-12R)
Unclassified report

DESCRIPTORS: *Flight simulators, Simulation, Human engineering, Instrumentation, Detection, Identification, Design, Guidance, Navigational aids, Landing-aids, Pilots, Training devices, Feasibility studies, Performance tests, Visual signals, Airplane landings.

This report identifies human factors research requirements for visual attachments to dynamic flight simulators, evaluates the state-of-the-art in visual simulation techniques for meeting these requirements, and discusses, within the context of a research and development cycle, alternative study settings (e.g., laboratory, simulation, and field) for investigating different types of human factors problems associated with visual cues and pilot performance. Current research problems dealing with visual cues and pilot performance during terminal flight and ground phases are grouped according to the nature of the task involved and types of variable related to the performance of these tasks. (Author)

AD-401 143 Div. 1, 30
(TISTA/VGW) OTS price $5.60

Human Sciences Research Inc., Arlington, Va.
SUITABILITY OF THE C-54 AS AN AIRPORT LANDING AIDS RESEARCH VEHICLE IN THE JET AGE.
Final rept.,
by Wallace F. Rollins and W. S. Vaughan, Jr.
Jan 63, 31p. incl. illus. tables, 23 refs. (Rept. no. HSR-RR-62/8-MK-X)
(Contract FAA/BRD-401, Proj. 421-11R)
Unclassified report

Original contains color plates; all DDC reproductions will be in black and white. Original may be seen in DDC Hq.

DESCRIPTORS: *Airports, *Transport planes, Jet transport planes, Approach lights, Marker lights, Visibility, Aviation safety, Test methods, Flight testing, Effectiveness, Terminal flight facilities, Airplane landing, Human engineering, Landing aids, Landings.

Study purpose was to determine the generality of an in-flight evaluation of airport marking and lighting (AML) systems when a Douglas C-54 is used as the test aircraft. The problem was explored from two points of view: first the generality of C-54 flight test results to a specific class of aircraft represented by the Convair 880; and second, the problem of increasing the generality of flight test results through increasing the precision of experimental procedures. Comparative analyses were made of the Douglas C-54 and the Convair 880 in terms of pilot tasks, cockpit visibilities, and approach and landing profiles. Recommendations are made for flight test modifications to increase generality of C-54 results to Convair-880-type aircraft. Experimental procedures to increase the general applicability of flight test results are recommended. (Author)

AD-401 474 Div. 1, 9
(TISTA/VGW) OTS price $3.60

Davidson Lab., Stevens Inst. of Tech., Hoboken, N. J.
EFFECT OF AERODYNAMIC PITCH CONTROL ON THE LOADS AND MOTIONS OF A SEAPLANE IN REGULAR WAVES,
by R. L. Van Dyck and P. Ward Brown. Jan 63,
17p. illus. tables, 10 refs. (Rept. no. 840)
(Contract NOa(s) 60-6032-c, Proj. 2238)
Unclassified report

DESCRIPTORS: *Seaplanes, Model tests, Water waves, Pitch (Motion), Damping, Control systems, Landings, Simulation, Motion, Loading (Mechanics), Experimental data, Tables, Impact shock, Hydrodynamics, Taxiing, Hydraulic models.

An experimental investigation into the effect of aerodynamic pitch control on the behavior of a seaplane model moving at high speed in regular waves is described. Pitch control is applied to reduce the seaplane impact loads and is attained primarily by increasing the stiffness of the seaplane in pitch. A seaplane hull model is used

for the tests with the aerodynamic characteristics simulated by mechanical means. Five different wave sizes are used. The data obtained are analyzed statistically to find, for each level of pitch control and each wave size, the vertical acceleration exceeded only once in 100 contacts. The effectiveness of pitch control is judged by its ability to attenuate this acceleration. The effect of wave size on the loads and motions is also found. It is concluded that, except in very steep waves exceeding a height-length ratio of 25:1, aerodynamic pitch control has practically no effect on the loads and motions in waves longer than twice the hull length. In short, steep waves, doubling the pitch stiffness results in a 20% reduction in the vertical acceleration exceeded only once in 100 impacts. (Author)

AD-401 596 Div. 1
(TISTA/AW) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
NEWS OF SCHOOLS OF HIGHER EDUCATION, AERONAUTICAL ENGINEERING (SELECTED ARTICLES).
27 Mar 63, 27p. incl. illus. refs. (Trans. no. FTD-TT-62-1769 from Russian Periodical, Izvestiya Vysshykh Uchenbykh Zavedeniy, Aviatsionnaya Tekhnika, No. 2, pp. 56-64, 86-94, 1962)
Unclassified report

DESCRIPTORS: *Aerodynamic configurations, Aerodynamic heating, Thermal conductivity, Equations, Integral equations, Differential equations, Metal plates, Deformation, Vibration, Delta wings, Swept wings, Mechanical engineering.

Contents:
Calculation of non-stationary temperature fields of a structure with consideration of the heat radiation during non-steady flight programs
Equilibrium equations for static bending and free vibration of irregularly shaped cantilever plates

AD-401 645 Div. 1
(TISTA/FRL) OTS price $1.10

Hughes Aircraft Co., Culver City, Calif.
CONTROL DATA REQUIREMENTS INVESTIGATION FOR OPTIMIZATION OF FUEL ON SUPERSONIC TRANSPORT VEHICLES.
Monthly progress rept. no. 7, 25 Feb-31 Mar 63. 1 Apr 63, 5p. illus. (Rept. no. 63H-1390/9299) (Contract AF 33(657)8822, Proj. 9056)
Unclassified report

DESCRIPTORS: *Jet transport planes, *Fuel consumption, Aerodynamic configurations, Research program administration, Jet planes, Air Force operations, Computers, Control, Transport planes, Operations research, Data, Supersonic planes.

A parametric investigation of the major variables affecting supersonic transports (SST) fuel consumption is presented. The major effort in this area was devoted to a concentrated parametric study consisting of nearly one hundred individual mission or trip simulations run on the IBM 7090. Initially the control parameters are: take-off weight, cruise conditions (Mach and altitude), terminal and enroute holding conditions, trip length, and diversions to alternate airports. (Author)

AD-401 662 Div. 1, 28
(TISTA/GEC) OTS price $2.60

Dunlap and Associates, Inc., Santa Monica, Calif.
AN EXAMINATION OF PILOT INFORMATION REQUIREMENTS.
30 Nov 62, 25p. incl. illus. 21 refs. (Subcontract to Douglas Aircraft Co., Inc., Long Beach, Calif., Contract Nonr-107600)
Unclassified report

DESCRIPTORS: *Pilots, *Flight instruments, *Display systems, Analysis, Take-off, Airplane landings, Flight paths, Human engineering, Military requirements.

This report presents information requirements methodology for pilots. It proposes a method for structuring the total information demands during flight, and presents a discussion of techniques for analyzing the effects of variation in types of missions and types of aircraft control. The basic analysis treats the general case of aircraft control, irrespective of mission type or information display technique. It is intended, however, that the methods be readily adaptable to a specific vehicle or mission, and be of direct value in display design and evaluation. (Author)

AD-401 675 Div. 1
(TISTP/WH) OTS price $8.60

Systems Technology Inc., Inglewood, Calif.
A SYSTEMS ANALYSIS OF LONGITUDINAL PILOTED CONTROL IN CARRIER APPROACH.
Final rept.,
by C. H. Cromwell and I. L. Ashkenas. June 62, 87p. incl. illus. tables, 17 refs. (Technical rept. no. 124-1)
(Contract NOw 61-0519-c)
Unclassified report

DESCRIPTORS: *Carrier landings, *Pilots, *Control systems, Stabilization, Aeronautics, Control stick, Jet planes.

The pilot's longitudinal control of an aircraft making a carrier approach is studied using systems analysis techniques. The pilot, airframe, and mirror optical landing aid are considered as elements in a closed-loop system. Mathematical expressions to approximate each element are derived or described. Various possible piloting techniques are examined by appropriately varying the pilot's transfer function, and by closing multiple control loops around the system. The question of whether the pilot should use stick or throttle for altitude control is examined. It is shown that the minimum approach speeds of five out of seven jet aircraft, all limited by the ability to control altitude and arrest rate of sink, can be predicted if it is assumed that the pilot uses throttle for altitude control. (Author)

AD-401 726 Div. 1
(TISTA/VGW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
COMMANDERS OF ROTOR-BORNE CRAFT,
by K. Raspevin. 11 Mar 63, 6p. (Trans. no. FTD-TT-62-1674 from Russian Newspaper, Pravda, p. 1, 18 Sep 62)
Unclassified report

DESCRIPTORS: *Helicopters, Polar regions, Flight paths, Pilots, Records.

AD-402 258 Div. 1
(TISTA/FRL) OTS price $1.60

Naval Air Test Center, Patuxent River, Md.
FIT CHECK AND FLIGHT TEST OF UNIVERSAL AIR REFUELING DROGUE.
Rept. no. 1 (Final),
by N. M. Gillette. 17 Apr 63, 11p. incl. illus.
(Rept. no. ST31-185)
Unclassified report

DESCRIPTORS: *Refueling, Flight testing, Test, Tanker planes, Maintenance, Aeronautical booms, Towed bodies.

The evaluation of the air refueling drogue is made to determine its compatibility with all available Navy air refueling systems. The prototype was physically compatible with systems tested, however, a single flight revealed serious design deficiencies in structural integrity and stability, correction of which is mandatory for satisfactory service use. It is recommended that the drogue not be accepted for service use in its present configuration, and that research and development be continued to obtain a satisfactory universal drogue. (Author)

AD-402 360 Div. 1, 27
(TISTP/PCR) OTS price $12.00

Electro-Optical Systems, Inc., Pasadena, Calif.
FEASIBILITY OF A SOLAR ENERGY DEVICE. PART I: DESIGN AND PERFORMANCE CONSIDERATIONS.
Report on Energy Conversion Research,
by Frederic E. Fuller. June 62, 150p. incl. illus. tables, 34 refs.
(Contract AF 33(616)5977, Proj. 7116)
(ARL 62-360, pt. 1) Unclassified report

DESCRIPTORS: *Solar rockets, *Ramjet engines, *Tailless airplanes, Feasibility studies, Ramjet inlets, Configuration, Diffusers, Reynolds number, Thrust, Heat transfer, Radiation effects, Ramjet engine nozzles, Mathematical analysis, Wing ramjet engines, Wings, Drag, Solar panels, Theory, Interference, Thin films (Storage devices), Equations, Solar radiation, Design.

The feasibility of a solar-powered aircraft is investigated. The configuration reached is a high-aspect-ratio flying wing with ramjet thrust. A statement is made with respect to feasibility with a recommendation of a program for further work. The statement of feasibility is supported by experimental investigation of solar radiation collection and inlet air diffusion and finally by design and performance analyses. (Author)

AD-402 379 Div. 1
(TISTA/GEC) OTS price $17.50

Hamilton Standard Div., United Aircraft Corp., Windsor Locks, Conn.
DESIGN AND DEVELOPMENT OF A FLIGHT PATH CONTROL SYSTEM FOR HELICOPTERS/VTOL AIRCRAFT.
Final rept., 15 June 62-8 Apr 63,
by A. J. Ostheimer and R. G. Giguere. 11 Apr 63, 1v. incl. illus. tables, 48 refs. (Rept. no. HSER 2653)
(Contract NOw 62-0873-D)
Unclassified report

DESCRIPTORS: *Helicopters, *Vertical takeoff planes, Antisubmarine aircraft, Automatic pilots, Design, Flight paths, Inertial navigation, Digital systems, Flight control systems.

The typical ASW helicopter mission is usually divided into two distinct phases, navigation and controlled flight. The navigation mode provides the pilot with his precise location and the flight profile to be flown. The autopilot implements the steering commands and provides a dynamically stable vehicle. This report provides a design which combines both phases to provide a flight path control system. This system enables the pilot to complete the ASW mission with minimum amount of navigation effort and manual control. The design provides the basis for a new concept in automatic flight control. (Author)

AD-402 382 Div. 1
(TISTA/GEC) OTS price $1.75

Lear Siegler Inc., Grand Rapids, Mich.
DISPLAY SYSTEMS FOR SUB- AND ZERO-GRAVITY FLIGHT.
Final rept., Aug 61-Mar 62 on ''Human Performance in Advanced Systems'',
by Robert Weiss. Jan 63, 54p. incl. illus. tables, 26 refs.
(Contract AF 33(657)7199, Proj. no. 7184)
(AMRL-TDR-63-11) Unclassified report

DESCRIPTORS: *Flight instruments, *Transport planes, *Jet transport planes, Flight paths, Weightlessness, Analog systems, Simulation, Gravity (Artificial), Instrument panels, Display systems, Control systems.

A study was performed of the controls and pilot displays used to fly a C-131B and KC-135 aircraft in a Keplerian trajectory to create zero-gravity conditions. Evaluation criteria for this maneuver were proposed and applied to two basic instrumentation systems which were developed. An analog simulation was formulated and these results will be used to further improve the systems. Recommendations are made for improved instrumentation which should enable consistent flights of 10 sec at zero-gravity plus or minus 0.005g. (Author)

AD-402 432 Div. 1, 27
(TISTA/GEC) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CIVIL AVIATION (SELECTED ARTICLES).
15 Mar 63, 20p. incl. illus. (Trans. no. FTD-TT-62-1924 from Grazhdanskaya Aviatsiya, No. 11, pp. 10-13, 28-29, 1962)
Unclassified report

DESCRIPTORS: *Civil aviation, *Transport planes, Turbopropeller jet engines, Aircraft, Wings, Periodicals, Design.

Contents:
The AI, Family of Soviet Avia Engines
AN-14, Pchelka, (The Clod)
Diskoplane, Flying Machines of the Future

2. ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-401 034 Div. 2, 6
(TISTP/MB) OTS price $1.60

Laboratories for Applied Sciences., U. of Chicago, Ill.
RESEARCH ON ATMOSPHERIC ATTENUATION OF INFRARED

RADIATION,
by Howard T. Betz. Dec 60, 13p. incl. illus. tables, 4 refs. (Rept. no. LAS-TN-E173-10)
(Contract AF 19(604)5877)
(AFCRL-228) Unclassified report

DESCRIPTORS: *Infrared radiation, Atmosphere, Spectra (Infrared), Fog, Particle size, Meteorology, Attenuation.

This report summarizes the results of a measurement program conducted at Air Force Cambridge Research Center Fog Site at Arcata, California. The purpose of the Arcata fog experiment was (1) to collect data permitting a test of the applicability of Junge's law of the distribution of particle size as a consistent phenomenon of fogs and (2) to verify the prediction values of transmission based upon particle-size distribution. The experimental data presented tend to corroborate both Junge's law for particle size distribution and the theory for attenuation using this law. (Author)

AD-401 100 Div. 2
(TISTP/FEM) OTS price $1.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
ALBEDO OF THE PLANET EARTH.
A Selected Bibliography,
comp. by Robert C. Gex. Apr 61, 14p. (Rept. no. SB-61-16)
Unclassified report

DESCRIPTORS: *Bibliographies, *Earth, Planets, Reviews, Documentation, Reflection, Surfaces, Albedo.

Albedo of the planet earth; a selected bibliography. Emphasis is placed on articles concerned with the albedo of the over-all earth. Information on albedo from specific surfaces, e.g. oceans, forests, cotton fields, etc. are not included. (Author)

AD-401 104 Div. 2
(TISTP/TL) OTS price $5.60

Air Force Cambridge Research Labs., Bedford, Mass.
COMPATIBILITY EVALUATION OF DATA HANDLING SUBSYSTEM.
Research note,
by H. R. Howe, P. I. Hershberg and others.
Dec 62, 51p. incl. illus. tables, 5 refs.
(Rept. no. AFCRL-62-1108)
(Proj. 433L)
Unclassified report

DESCRIPTORS: *Weather forecasting, *Meteorological parameters, Data processing systems, Test methods, Weather communications, Data transmission systems, Coding.

This report discusses an integrated high-speed data-handling subsystem designed to accommodate weather information. The subsystem utilizes standard telephone data circuits at speeds of 1000 through 2400 bits-per-second. The report indicates the results of an evaluation of equipments especially developed to accommodate the high-speed transmission function. These devices include: (a) a master control station, (b) a data selection unit, (c) data transmitters, and (d) data receivers. The proper equipment operation verifies the original design concept under which the data-handling system was developed. (Author)

AD-401 137 Div. 2, 8
(TISTP/FR) OTS price $6.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
RADAR OBSERVATIONS OF THE PLANET VENUS IN THE SOVIET UNION IN APRIL, 1961,
by V. A. Kotelnikov, V. M. Dubrovin, and others.
27 Feb 63, 58p. incl. illus. tables, 7 refs.
(Rept. no. 34G-12)
(Contract AF 19(628)500)
(AFESD-TDR-63-35) Unclassified report

Translated from Russian.

DESCRIPTORS: *Radar signals, Reflection, Venus, Analysis, Modulation, Filters (Electromagnetic wave), Errors, Radar equipment, Analysis.

The results of radar observation of the planet Venus in the Soviet Union in April, 1961, are given. The description and principle of operation of the equipment are set forth and the results of processing the reflected signals which were received are given. The value determined for the astronomical unit and the accuracy of measuring it are set forth. An analysis of the spectrum of the reflected signal is given. (Author)

AD-401 197 Div. 2, 15
(TISTP/MFA) OTS price $9.10

Travelers Research Center, Inc., Hartford, Conn.
FORECASTING THE MOVEMENT AND INTENSIFICATION OF CYCLONES AND ANTICYCLONES OVER EUROPE AND ASIA,
by Frederick P. Ostby, Jr. and Keith W. Veigas.
Mar 63, 100p. incl. illus. tables, 12 refs.
(Technical rept. no. 6; rept. no. 7045-58)
(Contract AF 19(626)16)
(ESD TDR 63-322) Unclassified report

DESCRIPTORS: *Meteorology, *Cyclones, *Anticyclones, Statistical analysis, Least squares method, Meteorological parameters, Meteorological charts, Statistical data, Mathematical prediction, Pressure, Weather forecasting, Motion.

Multiple linear-regression prediction equations were derived for the wintertime 12-, 24-, and 36-hr displacements and changes in central pressure of cyclones and anticyclones over Europe and cyclones over Asia. An important feature of the statistical prediction technique used in developing the equations is that the coordinates of measurement accompany the cyclone or anticyclone. The equations were tested on sizeable independent data samples and found to be stable; limited comparative-accuracy tests indicate that their results are competitive with those obtained by experienced subjective forecasters. (Author)

AD-401 200 Div. 2
(TISTP/FR) OTS price $3.60

Oceanographic Inst., Florida State U., Tallahassee.
EDGE WAVES OVER A SLOPING BEACH IN A ROTATING TWO-LAYERED SYSTEM,
by Hayato Iida and Takashi Ichiye. Apr 63, 31p. incl. illus. tables, 13 refs. (Technical rept. no. 4)
(Contract Nonr-98811, Proj. NR 083-16612-62)
Unclassified report

DESCRIPTORS: *Ocean waves, Beaches, Ocean currents.

Mathematical treatment of edge waves in a two-layered rotating sea reveals two main features

which may be important to the application of the theory. One is that no instability occurs to this system in a range of wave lengths of several to thousandsof kilometers. In a non-rotating system, shearing motion in a vertically stratified layer becomes unstable in a certain range of wave lengths as in Helmholz waves. Even in a rotating system, a mathematical model of cyclone waves and a simplified theory of meander of a wide ocean current predict that instability occurs in a two-layered system of geostrophic currents. Therefore, in this model there is no favorable range of wave lengths for which some distrubances may excite large internal waves. Another feature is that energy of an initially static mound of water and of disturbing forces due to atmospheric pressure or wind stresses is distributed for the most part among three barotropic modes. This again indicates that internal waves are not favorably excited by such disturbances with an order of dimension corresponding to a range of wave lengths considered. (Author)

AD-401 203 Div. 2
(TISTP/FR) OTS price $2.60

Oceanographic Inst., Florida State U., Tallahassee.
INTERNAL WAVES OVER A CONTINENTAL SHELF,
by Takashi Ichiye. Feb 63, 20p. incl. illus. 6 refs. (Technical rept. no. 3)
(Contract Nonr-98811, Proj. NR 083-16612-62)
Unclassified report

DESCRIPTORS: *Ocean waves, Ocean bottom topography.

Internal waves which are observed over a continental shelf have sometimes periods different from tidal periods and propagate in directions other than normal to the coast. This study deals with the waves travelling in two-dimensional directions in regard to the coast in a two-layered sea. Although the effect of Coriolis' force is also included, a wide range of periods of the waves is assumed. (Author)

AD-401 204 Div. 2
(TISTP/FEM) OTS price $1.60

Massachusetts U., Amherst.
DEFLATION BASIN IN THE COASTAL AREA OF THE SECHURA DESERT, NORTHERN PERU,
by H. T. U. Smith. Feb 63, 16p. incl. illus. 26 refs. (Technical rept. no. 3-A)
(Contract Nonr-2242(00))
Unclassified report

DESCRIPTORS: *Geography, *Deserts, *Geology, Climatology, Rainfall, Temperature, Winds, Sand, Dust storms, Terrain, Erosion, Mapping.

AD-401 234 Div. 2
(TISTP/MFA) OTS price $10.10

Travelers Research Center, Inc., Hartford, Conn.
OBJECTIVE ANALYSIS OF THE STRATOSPHERE, BASED ON MID- AND UPPER-TROPOSPHERIC DATA,
by David B. Spiegler, Keith W. Veigas, James J. Rahn. Nov 62, 125p. incl. illus. tables, 15 refs.
(Technical rept. no. 1; 7045-44)
(Subcontract to United Aircraft Corp., East Hartford, Conn, Contract AF 19(626)16)
(ESD TDR 62-347) Unclassified report

DESCRIPTORS: *Meteorology, *Meteorological radar, *Troposphere, *Stratosphere, Meteorological parameters, Pressure, Wind, Temperature, Meteorological charts, Periodic variations, Tests, Numerical analysis, Curve fitting, Radiosondes, Tropopause, Analysis.

Vertical-extrapolation regression equations for use in specifying initial-guess fields for objective analyses at 100 mb were derived (for four midseason months) through use of a screening procedure. Tests of the equations on independent data proved the equations to be stable, and the results for mid-season months are considered excellent. Further tests of the equations on data from one month on each side of each mid-season month indicated that approximately 95% of the equations are useful and stable for the ''side'' months. An experiment comparing the regression equations derived here with similar equations developed by the Navy in the 200-100-mb extrapolation interval illustrates that the newly derived equations yield significantly lower root-mean-square errors than the Navy equations. (Author)

AD-401 381 Div. 2
(TISTP/FR) OTS price $1.60

Air Force Cambridge Research Labs., Bedford, Mass.
DISPERSION OF RAYLEIGH WAVES ALONG THE MID-ATLANTIC RIDGE,
by Henry A. Ossing. Jan 63, 9p. incl. illus. table, 10 refs. (Rept. no. AFCRL 63-201)
(AF Proj. 7639)
Unclassified report

DESCRIPTORS: *Seismic waves, Scattering, Ocean bottom topography, Earthquakes.

Comparison of the characteristic dispersion curves of Rayleigh waves from earthquakes occurring in five sections of the Mid-Atlantic Ridge, whose travel paths to Weston include basin and basin-plus-ridge paths, is made with a theoretical curve taken from Dorman's Case 8099 and Dorman and Oliver's Case 8341 to determine the effect of the Ridge on the dispersion of Rayleigh waves. Small increments of variations between the averaged dispersion curves traversing only basin paths and those traversing basin and ridge paths in the significant period range 18 - 25 seconds are suggestive but not conclusive. Thus, the investigation of events having longer ridge travel paths is necessary. (Author)

AD-401 471 Div. 2
(TISTP/FEM) OTS price $6.60

Laboratory of Climatology, C. W. Thornthwaite, Associates, Centerton, N. J.
EVALUATION OF AN OCEAN TOWER FOR THE STUDY OF CLIMATIC FLUXES.
Final rept.,
by C. W. Thornthwaite, W. J. Superior, and R. T Field. Dec 62, 58p. incl. illus. tables, refs.
(Technical rept. no. 2)
(Contracts Nonr-299700, Proj. NR 389-101, and N62306-1122)
Unclassified report

DESCRIPTORS: *Climatology, *Micrometeorology, Fluxmeters, Anemometers, Towers, Interference, Drag, Shear stresses, Wind, Velocity, Energy, Moisture, Oceans, Sea breeze.

Preliminary conclusions concerning the micrometeorological conditions around an ocean platform are reported. Recommendations for its future use in studying the fluxes of energy and moisture over the surface of the ocean, and some of our recent experience with flux measurements over land are presented. (Author)

AD-401 651 Div. 2
(TISTP/GRW) OTS price $8.60

Air Force Cambridge Research Labs., Bedford, Mass.
ATLAS OF MONTHLY MEAN STRATOSPHERE CHARTS, 1955-1959. PART II, JULY-DECEMBER,
by H. Stuart Muench and Thomas R. Borden, Jr. Oct 62, 1v. incl. illus. tables, 14 refs. (Air Force Surveys in Geophysics no. 141; AFCRL-62-494 (II))
Unclassified report

Original contains color plates; all DDC reproductions will be in black and white. Original may be seen in DDC Hq.

DESCRIPTORS: *Stratosphere, *Meteorological parameters, *Meteorological charts, Barometric pressure, Wind, Tables, Atmopheric motion, Atmospheric temperature, Periodic variations.

Average conditions in the stratosphere over the northern hemisphere are shown during the period July 1955 to July 1959. Monthly mean charts of contours and isotherms are presented for the 100-mb, 50-mb, and 25-mb levels for each of the 48 months. In addition, four-year composite means are presented for each of the twelve months of the year at each level. The maps clearly show how the monthly mean pattern for a winter month can vary considerably from year to year, whereas the patterns for the summer months vary but little from year to year. (Author)

AD-401 660 Div. 2
(TISTP/FEM) OTS price $5.60

Douglas Aircraft Co., Inc., Santa Monica, Calif.
SUMMARY OF PRESENT KNOWLEDGE ON SPACE RADIATION,
by A. D. Goedeke. Feb 63, 54p. incl. illus. tables, 53 refs. (Engineering paper no. 1567)
Unclassified report

Presented at the 1963 National Winter Convention on Military Electronics, Los Angeles, 1 Feb 63.

DESCRIPTORS: *Space environmental conditions, *Solar radiation, Hazards, Shielding, Lead, Van Allen radiation belt, Cosmic rays, Solar flares, Alpha particles, X-rays, Gamma rays, Protons, Electrons, Nuclei, Solar wind, Electromagnetic waves, Dosage.

The present knowledge of the nature and properties of interplanetary plasma, galactic, solar, and trapped radiations is discussed. Particular emphasis is placed upon solar cosmic radiation, solar flares, solar-terrestrial relationships, and time variations. Results of analyses of various events is described in light of biological dose restrictions. Present research programs on prediction of solar cosmic rays and their time variations are also discussed. (Author)

AD-401 682 Div. 2, 15
(TISTP/WH) OTS price $2.60

California U., Berkeley.
STOCHASTIC MODELS FOR THE INTERPRETATION OF METEOROLOGICAL DATA.
Final rept.,
by F. N. David. Jan 63, 23p. incl. table.
(Contract AF 19(604)8051, Proj. 8624)
(AFCRL 63-241) Unclassified report

DESCRIPTORS: *Meteorological parameters, Atmosphere models, Meteorology, Statistical distributions, Temperature, Barometric pressure, Atmospheric precipitation, Wind, Statistical analysis.

Work concerned (1) the development of one or more chance mechanisms or stochastic processes for the behavior of atmospheric variables, and similar random variables, which would lead to the observed serial and spatial correlations of winds, temperatures, pressures, precipitation, etc., and (2) development of optimum procedures for estimating the parameters of the mechanisms, and for determining their significance. (Author)

AD-401 685 Div. 2, 25
(TISTP/WH) OTS price $4.50

Mathematics Research Center, U. of Wisconsin, Madison.
ON THE MOTION OF A LIQUID IN A SPHEROIDAL CAVITY OF A PRECESSING RIGID BODY,
by P. H. Roberts and K. Stewartson. Feb 63, 43p. 11 refs. (MRC technical summary rept. no. 374)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Spheres, *Liquids, *Bodies of revolution, Magnetic fields, Viscosity, Earth, Terrestrial magnetism, Rotation, Hydrodynamics.

Neglecting magnetic effects the precession of the mantle of the Earth is responsible for hydrodynamic motions in the liquid core because, (1) the velocity of the inner boundary of the mantle along its normal is non-zero unless the core boundary is a perfect sphere, (2) there is a viscous coupling between core and mantle, (3) there is a magnetic coupling between core and mantle because lines of geomagnetic force thread each. In this preliminary discussion of the problem, we suppose that the core boundary is an oblate spheroid of eccentricity e; it is shown that the relative importance of (1) and (2) depends in an essential way on the value of $R_1 = \omega e^2/\Omega$, where ω is the angular velocity of rotation and $\Omega (\ll \omega)$ is the angular velocity of precession. Since R_1 is almost certainly large for the Earth, the present discussion is limited to this case. (Author)

AD-401 689 Div. 2, 24
(TISTP/FEM) OTS price $11.50

Civil Engineering Systems Lab., Mass. Inst. of Tech., Cambridge.
ANALYTICAL AERIAL TRIANGULATION ERROR ANALYSIS AND APPLICATION OF COMPENSATING EQUATIONS TO THE GENERAL BLOCK TRIANGULATION AND ADJUSTMENT PROGRAM.
Final technical rept., Mar 60-Feb 62.
Feb 62, 145p. incl. illus. tables, 7 refs.
(Publication no. 153; Research rept. no. R62-4)
(Contract DA 44-009-eng-4420)
Unclassified report

DESCRIPTORS: *Photogrammetry, *Digital computer, *Aerial photography, Distortion, Analysis, Atmosphere models, Least squares method, Aerial cameras, Lenses, Films, Simultaneous equations, Special functions (Mathematical), Statistical functions, Probability, Equations, Errors, Programming (Computers), Atmospheric refraction.

Research directed toward the general problem of adjustment and compensation of errors in the analytical aerial photogrammetric triangulation problem is described. The primary objective is the incorporation in the General Block Triangulation and Adjustment Program, supplied by the government, the necessary routines for effective adjustment of random errors. Studies

of the particular error sources in the photogrammetric system are included. The general method of incorporating the least squares adjustment of random errors is presented along with a detailed mathematical description of the final program. The program was tested using real and fictitious data. While the program is effective in adjusting for random errors, the systematic error content of the available data is dominant. Considerable improvement in the compensation of lens and film errors is required. A procedure is recommended for compensating for atmospheric refraction effects. (Author)

AD-401 730 Div. 2
(TISTM/CCH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
DETERMINING ELECTRICAL PROPERTIES OF GRAPHITE AT HIGH TEMPERATURES,
by L. F. Mal'tseva and E. N. Marmer. 14 Feb 63, 10p. incl. illus. 2 refs. (Trans no. FTD-TT-62-1708 from Poroshkovaya Metallurgiya, no. 1, pp. 50-55, 1962)
Unclassified report

DESCRIPTORS: *Graphite, *High temperature research, Electrical properties.

AD-401 732 Div. 2, 15
(TISTP/JW) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
OPTICAL DETERMINATION OF THE CONCENTRATION OF WATER DROPS IN THE ATMOSPHERE DEPENDING ON THE RADIUS,
by G. P. Gushchin. 25 Feb 63, 17p. incl. illus. 8 refs. (Trans. no. FTD-TT-62-1803 from Aktinometriya i atmosfernaya optika, Leningrad, Gidrometeoizdat, pp. 218-227, 1961)
Unclassified report

DESCRIPTORS: *Atmospheric precipitation, Linear systems, Optical analysis, Scattering, Atmospheric refraction, Equations.

Starting from Mie's law and using the numerical values of the scattering function for water, the author gives a system of linear equations determining for n wavelengths the extinction caused by a mixture of droplets with n different radii. After solving the system of equations all n of the concentration corresponding to n radii were obtained. In spite of the fact that the system of equations is given for droplets of pure water it was shown that it can be used with sufficient accuracy for droplets with a retractive index up to 1.4. (Author)

AD-401 780 Div. 2
(TISTP/FEM) OTS price $2.60

Aerospace Information Div., Washington, D. C.
FORECASTING SOLAR FLARES: A REVIEW OF THE WORK OF A. B. SEVERNYY IN THE PERIOD 1960-1962. SELECTED ABSTRACTS.
28 Mar 63, 21p. (AID rept. no. P-63-43)
Unclassified report

DESCRIPTORS: *Solar radiation, *Abstracts, *Solar flares, Noise (Radio), Sunspots, Ultraviolet radiation, Cosmic ray bursts, Plasma physics, Spectroscopy, Terrestrial magnetism.

These abstracts are considered to be indicative of the development of solar flare investigations at the Crimean Astrophysical Observatory. These investigations recently culminated in the announcement of a new method of forecasting solar flares two to three days in advance. As yet, very little information has been made available on the specifics of the prediction method, however, much can be inferred from an analysis of the work of the Severnyy group. An attempt is made to evaluate the Severnyy method. Individual Soviet-bloc (Rumanian, Polish, Czech, and Ukrainian) works on solar flare research have also been included when deemed significant. (Author)

AD-401 804 Div. 2
(TISTP/JW) OTS price $8.60

Army Tank-Automotive Command, Detroit, Mich.
PRESSURE SINKAGE TESTS ON SYNTHETIC AND NATURAL CLAY SOILS,
by Parker D. Trask, David T. Snow, and others. Apr 62, 87p. incl. illus. tables, refs. (Rept. no. LL 75)
(Proj. DA-04-200-ORD-726)
Unclassified report

DESCRIPTORS: *Clay, Deformation, Pressure, Soils, Moisture, Soil mechanics.

An investigation of the pressure-sinkage relationship of various clays and mixtures of clay with clastic silt and sand has been conducted. Bekker's soil parameters were used to describe the strength of the soils. Both commercially available clays and a natural clay soil and mixtures of these soils with clastic materials of varying grain size were investigated. The investigation also included the effects of two other variables on the strength of the soil, water content and clay-clastic ratio. The pressure sinkage tests on the soil samples consisted of forcing circular or rectangular footings into the sample at a constant rate of strain and measuring the resisting force as a function of the sinkage. Bekker's strength parameters are derived from the resulting curves. (Author)

AD-401 810 Div. 4
(TISTP/MFA) OTS price $2.00

North Carolina State Coll., Raleigh.
RESEARCH ON GROWTH AND DEFORMATION MECHANISMS IN SINGLE CRYSTAL SPINEL.
Final rept., Feb 61-July 62,
by Hayne Palmour, III, W. Wurth Kriegel, and R. Douglas McBrayer. Feb 63, 72p. incl. illus. tables, refs.
(Contract AF 33(616)7820, Proj. 1(8-7350))
(ASD-TDR-62-1086) Unclassified report

DESCRIPTORS: *Crystal growth, *Single crystals, *Crystal structure, Spinels, Crystal lattice defects, Synthesis, Nucleation, Laboratory equipment, Laboratory furnaces, Electrical properties, Optical properties, Mechanical properties, Chemical analysis, Spectroscopy, Structural properties.

The first phases of a continuing program of research on growth and deformation processes in magnesium aluminate spinel are described. Spinel-forming reactions, structure and properties of spinel, synthesis of spinel feed materials (including a study of the effects of irradiation on spinel formation), techniques and apparatus for crystal growth with Verneuil oxyhydrogen and RF plasma devices, and the effect of atmosphere on precipitation hardening of alumina-rich spinel have been studied. A summary of structural and physical properties of spinel is included. (Author)

Division 2 - ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-401 825 Div. 2
(TISTP/MFA) OTS price $3.60

Aeronautical Chart and Information Center, St. Louis, Mo.
MAP ACCURACY EVALUATION. PART II. EVALUATION OF VERTICAL MAP INFORMATION.
Jan 63, 1v. incl. illus. table (ACIC reference publication no. 2, pt. 2)
Unclassified report

DESCRIPTORS: *Mapping, *Geodesics, Photogrammetry, Surveying, Mathematical analysis, Terrain, Map reading, Measurement.

The method described in this manual considers the effect of scale, slope, contour interval, and horizontal displacement of contours on elevation error and provides a means for obtaining the average slope of terrain in the most rugged 10 percent of each area which is to be given a separate evaluation. The numerical value derived by the described method is considered the most realistic estimate of the Map Accuracy Standard (MAS) or 90 percent linear probability of the vertical accuracy which can be obtained by office methods. (Author)

AD-401 877 Div. 2
(TISTP/FEM) OTS price $2.60

Brown U., Div. of Applied Mathematics, Providence, R. I.
LONG SURF,
by D. V. Ho, R. E. Meyer, and M. C. Shen.
Mar 63, 17p. illus. 11 refs. (Technical rept. no. 4; Rept. no. 562(34)/4)
(Contract Nonr-56234, Proj. NR 083 167)
Unclassified report

DESCRIPTORS: *Ocean waves, *Water waves, Hydrology, Acceleration, Damage, Velocity, Mathematical analysis, Equations, Beaches, Erosion.

A digest of a mathematical investigation on surf due to long swell is offered to present the assumptions and conclusions in a form usable by the experimental physicist. The results so far obtained are mainly qualitative, but quite detailed in some respects, and radically different from the results of earlier analyses. Some new observational material is also presented. It appears that a simple, non-linear model is capable of describing the essence of the whole phenomenon - breaker formation, breaker collapse, run-up and back-wash - for a quite representative type of surf. (Author)

AD-401 930 Div. 2
(TISTP/MFA) OTS price $8.10

Geophysical and Polar Research Center, U. of Wisconsin, Madison.
A SURVEY OF DATA ON MICROSCOPIC EXTRATERRESTRIAL PARTICLES,
by Richard A. Schmidt. Jan 63, 84p. incl. illus. tables, refs. (Research Rept. Series no. 63-2)
Unclassified report

DESCRIPTORS: *Interstellar matter, *Particles, *Astrophysics, Exosphere, Strange particles, Cosmic rays, Asteroids, Meteorites, Microstructure, Bibliographies, Chemical analysis, Astronomical data.

A survey of data on microscopic extraterrestrial particles was undertaken in order to provide an up-to-date compilation of existing knowledge on the subject as a reference for new research being conducted at the Geophysical and Polar Research Center of the University of Wisconsin. The objective of the survey was to bring together as much available data as possible. Principal attention was devoted to the following information about these particles: description, size, physical properties, chemical composition, occurrence, location of samples, annual deposit, and theories of origin. (Author)

AD-402 073 Div. 2
(TISTP/MFA) OTS price $6.60

Massachusetts Inst. of Tech., Cambridge.
SOLID-STATE AND MOLECULAR THEORY GROUP.
Quarterly progress rept. no. 48.
15 Apr 63, 66p. incl. illus. tables, 5 refs.
(Contract Nonr-184134; In cooperation with Lincoln Lab., Mass. Inst. of Tech., Lexington, Contract AF 19(628)356)
Unclassified report

DESCRIPTORS: *Crystal structure, *Symmetry, *Solid state physics, Transition elements, Iron, Energy, Gallium, Polyatomic molecules, Atomic orbitals, Chemical compounds, Harmonic analysis, Monte Carlo method, Molecular structure, Groups (Mathematics), Crystal lattices.

AD-402 091 Div. 2, 25
(TISTA/GEC) OTS price $2.60

Space Sciences Lab., U. of Calif., Berkeley.
INTERPLANETARY GAS VIII. ON THE ROLE OF RADIATIVE LOSSES,
by Peter Bodenheimer, John C. Brandt, and R. R. Robbins. 1962, 27p. incl. tables, refs.
(Technical rept. no. 2; Series no. 4, Issue no. 7)
(Grant Nonr (G)-00051-62, Proj. NR 046 796)
Unclassified report

DESCRIPTORS: *Solar corona, *Solar atmosphere, Heat transfer, Electron density, Temperature, Mathematical analysis, Astronomy, Interplanetary trajectories, Space flight, Gas ionization, Thermal radiation.

The radiative losses due to free-free transitions, free-bound transitions, and permitted and forbidden line emission have been evaluated for all ions which are present in significant amounts in the extended solar corona from solar radii to solar radii. Most of the radiative losses occur interior to solar radii, and they are dominated by line emission in the extreme ultraviolet and x-ray wavelengths. In general, the radiative losses are found to be unimportant, and the consequences of this result are discussed in terms of the semiempirical model recently presented by Brandt and Michie (Ap. J. 136:1023, 1962). (Author)

AD-402 177 Div. 2
(TISTP/FEM) OTS price $2.60

Air Force Cambridge Research Labs., Bedford, Mass.
A SIMPLIFIED SONIC ANEMOMETER FOR MEASURING THE VERTICAL COMPONENT OF WIND VELOCITY,
by J. Chandran Kaimal. Jan 63, 17p. incl. illus. 6 refs. (Rept. no. AFCRL-63-203; Instrumentation for Geophysics and Astrophysics no. 24)
Unclassified report

DESCRIPTORS: *Anemometers, Transducers (Acoustic), Ultrasonic radiation, Transmitter-receivers, Preamplifiers, Wind, Velocity, Acoustic equipment.

The design and operation of a continuous-wave sonic anemometer for measuring fluctuations in the vertical wind velocity component are described. Use of highly directional transducers has greatly simplified the design. Field tests show that the instrument responds to the vertical velocity fluctuations exactly as the more complicated but successful University of Washington sonic anemometer-thermometer. This system gives stable performance during prolonged continuous operation. The stability, accuracy, and simplicity make it a valuable tool for investigations of turbulence in the atmospheric boundary layer. (Author)

AD-402 182 Div. 2, 18, 6, 25
(TISTA/VGW) OTS price $8.10

Eastman Kodak Co., Rochester, N. Y.
SPACE BACKGROUND STUDY.
Semi-annual rept.,
by Charles Gramm, William Haynie and others.
8 July 60, 87p. incl. illus. tables, 6 refs.
(Rept. no. EK/ARD ED-442)
(Contract DA 30-069-ord-2803)
Unclassified report

DESCRIPTORS: *Stars, Astronomical data, Brightness, Infrared detectors, Antimissile defense systems, Spectra (Infrared), Spectra (Visible), Spectrophotometers, Blackbody radiation, Tables, Infrared radiation.

A theoretical model of the infrared stellar background is presented, based on a blackbody extrapolation of stellar data for the visible and near infrared regions. Stellar magnitudes are limited by the irradiance of a 2-square-meter 300 K target at 500 nautical miles. The total number of interfering stars decreases from the order of one hundred thousand in the visual region to only several hundred for the infrared beyond 7.5 microns. Star maps of the celestial sphere and a table of 185 stars in the order of their infrared magnitudes are included. (Author)

AD-402 213 Div. 2, 12, 19
(TISTA/GEC) OTS price $1.10

Air Force Cambridge Research Labs., Bedford, Mass.
EVOLUTION OF THE ANNA-1 SATELLITE OPTICAL BEACON.
Research rept.,
by T. Wirtanen. Feb 63, 7p. incl. illus. (Rept. no. AFCRL-63-56; Instrumentation for Geophysics and Astrophysics no. 26)
Unclassified report

DESCRIPTORS: *Scientific satellites, *Beacon lights, Astronomy, Navigational aids, Navigation satellites, Mapping, Surveying, Xenon lamps, Geodesics, Design.

ANNA-1, the first geodetic satellite, carries the first optical beacon system designed for geodetic space experimentation. The ancestry of the flash tubes used in this system is an interesting example of the evolution of a component before it actually flies as part of a scientific satellite's payload. During the gestation period of the ANNA-1 satellite, the optical beacon underwent several major changes which were directed toward increasing the utility and reliability of the beacon, as well as its compatibility with other instruments in the ANNA-1 Satellite. A prerequisite for satellite experimentation is the ability to make major physical changes to the experimental package without altering the experiment's potential. (Author)

AD-402 264 Div. 2
(TISTP/WH) OTS price $1.10

Aerospace Information Div., Washington, D. C.
THE CORE--MANTLE DISCONTINUITY,
by S. M. Stishov. 4 Apr 63, 6p. incl. illus. 11 refs. (AID rept. T-63-47; trans. from Geokimiya, no. 11, pp. 989-992, 1962)
Unclassified report

DESCRIPTORS: *Earth, *Liquid metals, Silicides, Silicates, Minerals.

The hypothesis of a metallized silicified earth core is discussed. (Author)

AD-402 272 Div. 2
(TISTP/FR) OTS price $3.60

Naval Underwater Ordnance Station, Newport, R. I.
INTERPRETING PROFILES OF SOUND VELOCITY IN SEA WATER,
by C. F. Morey. Apr 63, 33p. incl. illus. 3 refs. (Rept. no. TM 286)
Unclassified report

DESCRIPTORS: *Underwater sound, Velocity, Sea water, Temperature, Salinity, Hydrostatic pressure.

A technique is given for the interpretation of sound velocity profiles in terms of basic oceanographic parameters of temperature, salinity and depth. An empirical relationship between these parameters and the speed of sound in sea water was developed by Wayne D. Wilson of the U. S. Naval Ordnance Laboratory. Using Wilson's equation as a tool, graphs were prepared which show the rate of change of sound velocity with respect to temperature, salinity, pressure, or any combination of these parameters. Typical sound velocity profiles are also presented and interpreted in terms of the environmental conditions which produce them. These graphs and analyses should help engineers to infer general oceanographic conditions from given sound velocity profiles, and to determine the strength and extent of temperature and salinity gradients. (Author)

AD-402 309 Div. 2, 8
(TISTP/MC) OTS price $3.60

Air Force Cambridge Research Labs., Bedford, Mass.
RADIO ASTRONOMY - A SURVEY,
by A. W. Barber and J. P. Mullen. Jan 63, 30p. incl. illus. tables, 26 refs. (Rept. no. AFCRL 63-224)
(AF Proj. 5629)
Unclassified report

DESCRIPTORS: *Radio astronomy, *Extraterrestrial radio waves, *Radio transmission, Solar radiation, Radiometers, Meteors, Moon, Planets, Radio interferometers.

The subject of Radio Astronomy is reviewed from both the historical and instrumentation viewpoints. Problem areas and fruitful areas are noted. Both Air Force and Navy programs are discussed. (Author)

AD-402 337 Div. 2
(TISTP/PCR) OTS price $3.60

Lamont Geological Observatory, Palisades, N. Y.
MAGNETIC TOTAL INTENSITY MEASUREMENTS IN THE

DRAKE PASSAGE,
by George Peter. Oct 62, 18p. illus. 12 refs.
(Technical rept. no. 5; CU-5-62)
(Contract Nonr-26648)
Unclassified report

DESCRIPTORS: *Magnetic fields, *Terrestrial magnetism, Instrumentation, Magnetometers, Shipborne, Geology, Measurement, Earth.

From 1958 to 1962 the Lamont Geological Observatory obtained magnetic total intensity measurements over 5500 nautical miles of track between Tierra del Fuego, S. America, and Palmer Peninsula, Antarctica. Most of the measurements were made by the R/V VEMA of the L.G.O., and the A.F.T. YELCHO of the Chilean Navy Hydrographic Office. In the vicinity of the Tierra del Fuego additional measurements were made by the A.R.A. CAPITAN CANEPA and the A.R.A. GENERAL ZAPIOLA, both of the Argentine Navy Hydrographic Office. (Author)

AD-402 358 Div. 2
(TISTP/PCR) OTS price $11.50

Beers, Roland F., Inc., Alexandria, Va.
ANALYSIS AND EVALUATION OF SEISMIC DATA FOR ON-SITE INSPECTION PROJECT VELA.
Final rept.,
by Lawrence B. Luhrs and Lawrence L. Davis.
23 Feb 63, 1v. incl. illus. tables.
(Contract AF 33(600)43368)
Unclassified report

DESCRIPTORS: *Seismic waves, Measurement, Underground explosions, Stratigraphy, Minerals, Instrumentation, Terrain, Configuration, Nuclear explosions.

The objective of the near-surface velocity survey was to delineate anomalous horizontal velocity variations and attenuation of first arrival energy in the shallow Oak Spring tuff due to explosion-produced fracturing and/or faulting. The development and use of horizontal seismic ranging, represents an effort to apply the underlying concepts of echo ranging as used in antisubmarine warfare in the ocean, to the problem of detecting cavities at long range from the surface of the ground. To enable a complete evaluation of the seismic results, it is required to know the probable range and magnitude of the effects of the explosions on the mechanical and physical properties of the tuff. To provide a basis for such evaluation, available data on the tuff were collected and collated. The reflection seismograph survey of Tatum Salt Dome consists of two lines, one northeast and the other southwest, across the dome. The purpose of this survey is to define the configuration of the top of the salt and other major stratigraphic units in sufficient detail to enable evaluation of the structural effects of subsequent nuclear testing. (Author)

AD-402 374 Div. 2
(TISTP/FR) OTS price $1.60

Woods Hole Oceanographic Institution, Mass.
CURRENT MEASUREMENTS EMPLOYING THE RADIO DROGUE SYSTEM,
by Charles E. Parker. Mar 63, 14p. incl. illus.
(Ref. no. 63-13)
(Contract Nonr-335100)
Unclassified report

DESCRIPTORS: *Ocean currents, Measurement, Instrumentation.

Current measurements were made in an area about 140 mi. south and southeast of Bermuda, covering approximately 72,000 square miles, using a radio drogue system. Data presented are concerned with observations of three 64-foot-diameter drogues which were set at 1000 meters in depth and followed from mid June 1962 to the end of October 1962. Although some aspects of the data are immediately apparent such as the description of a large eddy encompassing about 34,000 square miles and evidence of a second one of equal size, there are indications that oscillations due to large tidal effects are present. (Author)

AD-402 410 Div. 2, 15
(TISTP/PCR) OTS price $1.60

Air Force Cambridge Research Labs., Bedford, Mass.
TRANSFORMATION OF THE EQUATIONS OF MOTION OF METEOROLOGY INTO ARBITRARY ORTHOGONAL COORDINATES,
by Eugene M. Luks. Dec 62, 12p. incl. illus. 5 refs. (Rept. no. AFCRL-62-1109)
(In cooperation with Regis Coll., Weston, Mass., Contract AF 19(604)7247, Proj. 8628)
Unclassified report

DESCRIPTORS: *Meteorological charts, *Transformations (Mathematics), Equations, Motion, Vector analysis, Partial differential equations, Operators (Mathematics), Meteorology.

The earth is usually represented in Cartesian Coordinates on a projection plane with the atmosphere mapped three-dimensionally. Most such maps are orthogonal and in this case the equations of motion take a particularly simple form. (Author)

AD-402 472 Div. 2, 25
(TISTP/RD) OTS price $3.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ENGINEERING PHYSICS (SELECTED ARTICLES).
21 Mar 63, 37p. incl. illus. refs. (Trans. no. FTD-TT-63-158 from Inzhenernofizicheskiy Zhurnal, 5:11, pp. 3-7, 8-11, 12-24, 1962)
Unclassified report

DESCRIPTORS: *Gas flow, *Evaporation, Fluid dynamic properties, Supersonic characteristics, Heat transfer.

AD-402 495 Div. 2
(TISTW/JEA) OTS price $2.60

Manchester U. (Gt. Brit.).
RESEARCH INTO METHODS OF DETERMINING THE RELATIVE HEIGHTS OF PHYSIOGRAPHIC FEATURES OF THE MOON.
Annual summary rept. no. 1,
by Zdenek Kopal. Nov 62, 20p. incl. illus.
(Contract AF 61(052)524)
(AFCRL 63-406) Unclassified report

DESCRIPTORS: *Moon, *Surface area, *Mapping, Numerical analysis, Measurement, Geodesics, Stereoscopic map plotters, Disks, Least-squares methods, Corrections, Series, Surface properties, Lunar environment.

The research carried out was concerned with the following problems: (1) re-determination of the libration constants of the Moon; (2) evaluation and measurements of the old Paris photographic plate of the Moon - covering the full range of libration - for determining the departures of the actual surface of the Moon

from a sphere; and (3) development of methods for the determination of small differences in height (or depth) of very shallow surface features - such as the lunar domes, rills, and wrinkle ridges - above (or below) the surrounding landscape. (Author)

3. CHEMICAL WARFARE EQUIPMENT AND MATERIALS

AD-401 828 Div. 3, 16
(TISTM/CCH) OTS price $1.60

Western Reserve U., Cleveland, Ohio.
PERCUTANEOUS ABSORPTION.
Progress rept. no. 6,
by Richard B. Stoughton. 15 Mar 63, 12p.
incl. illus. tables.
(Contract DA 18-108-405-cml-215)
Unclassified report

DESCRIPTORS: *Skin, *Labeled substances, *Radioactive isotopes, Pathology, Temperature, Perspiration, Absorption, Carbon, Penetration.

Research efforts were directed in three main areas: in vitro measurement of percutaneous absorption of C(14)-labelled compounds through human skin; estimation of percutaneous absorption of a specific anticholinergic agent; the effect of this topical anticholinergic agent on delivery of sweat in human skin and on the development of miliaria; in vivo studies of the existence of a reservoir in human keratin and its capacity; this reservoir is for topically applied chemical agents. (Author)

AD-402 155 Div. 3, 16
(TISTM/CCH) OTS price $8.60

Army Biological Labs., Frederick, Md.
BIBLIOGRAPHY ON LEPTOSPIROSIS SUPPLEMENT, 1957 TO 1962.
Mar 63, 91p.
Unclassified report

DESCRIPTORS: *Bibliography, Etiology, Pathology, Metabolism, Immuniology, Disease vectors, Epidemiology, Ecology, Communicable diseases, Test methods, Histological techniques, Immunity, Man, Antibiotics, Chemotherapeutic agents, Enzymes, Diagnosis, Animals, Laboratory animals, Hematology, Biological warfare agent, Chemical warfare agents, Spirochaetales.

4. CHEMISTRY

AD-401 095 Div. 4, 30
(TISTM/ODN) OTS price $1.60

Plastics Lab., Princeton U., N. J.
HIGH POLYMER RESEARCH.
Interim progress rept., 15 July 62-31 Mar 63,
by L. F. Rahm. 31 Mar 63, 11p. (Rept. no. 66)
(Contract DA 31-124 ARO(D)21 and Grant no. ARO(D)21, Proj. NR 356-375)
Unclassified report

DESCRIPTORS: *Polymers, *Plastics, Polymerization, Organic materials, Synthesis (Chemistry), Semiconductors, Crystallization, Failure (Mechanics), Dielectrics, Mechanical properties.

Contents:
Chemical section (a) polymerization of nonconjugated double-bond systems, (b) synthesis of multiple-strand polymers
Dielectrics section (a) studies in semi-conducting high polymers
Mechanical section (a) failure mechanism in glassy state polymers, (b) crystallization mechanisms in isotactic polymers

AD-401 103 Div. 4, 30
(TISTM/TCG) OTS price $.50

Cincinnati U., Ohio.
SPECTROPHOTOMETRIC DETERMINATION OF THE pKa's OF SOME AROMATIC AMINES.
Final rept., June-Aug 62 on Materials Analysis and Evaluation Techniques,
by Mark Bixler. Feb 63, 9p. incl. tables, 3 refs.
(Contract AF 33(616)7450, Proj. no. 7360)
(ASD TDR 62-1077) Unclassified report

DESCRIPTORS: *Amines, *Spectra (Visible and ultraviolet), *PH, *Organic compounds, Organic solvents, Acids, Potentiometers, Measurement, Test methods, Chemical equilibrium, Spectrophotometers, Dissociation

The dissociation constants of the conjugate acids of aniline, alpha-naphthylamine and beta-naphthylamine have been determined from their UV absorption spectra in 50 wt-% ethanol-water solution. The values obtained have been compared with potentiometric measurements. (Author)

AD-401 254 Div. 4
(TISTM/TCG) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE FORMATION OF HYDRAZINE BY THE ACTION OF GAMMA-RADIATION ON SOLID AND LIQUID AMMONIA,
by Yu. A. Sorokin and S. Ya. Pshezhetskiy.
22 June 62, 7p. incl. illus. tables, 1 ref.
(Trans. no. FTD-TT-62-838, from Doklady Akademii Nauk SSSR, 138:4, pp. 880-883, 1961)
Unclassified report

DESCRIPTORS: *Ammonia, *Gamma rays, *Organic compounds, Liquefied gases, Solidified gases, Free radicals, Radiation chemistry, Chemical reactions, Synthesis.

The formation of hydrazine in liquid and solid ammonia exposed to gamma-radiation was studied. Data are given on the characteristics of the effect of the state of the process. (Author)

AD-401 368 Div. 4, 20
(TISTM/ODN) OTS price $3.60

Space Sciences Lab., General Electric Co.
Philadelphia, Pa.
THE PRODUCTS OF FLASH PYROLYSIS OF PHENOL-FORMALDEHYDE BY TIME-OF-FLIGHT MASS SPECTROSCOPY,
by Henry L. Friedman. Sep 62, 27p. incl. illus. tables, 11 refs. (Rept. no. 62SD81)
(Contract AF 04(647)617) and AF 33(616)6841)
Unclassified report

DESCRIPTORS: *Phenolic plastics, Decomposition, Mass spectroscopy, Spectrum analyzers, Degradation, Gases, Hydrocarbons, Quantitative analysis, Chemical reactions, High temperature research, Surface temperatures, Pyrolysis.

A sample of phenol-formaldehyde was flash pyrolyzed eleven times in the reaction chamber of a time-of-flight mass spectrometer. Quantitative analyses were determined for pyrolysis products which were present within ten seconds after each flash. A high degree of consistency between compositions of products from consecutive flashes resulted. A discussion of the results is presented. (Author)

AD-401 369 Div. 4, 10
(TISTM/ODN) OTS price $1.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
ESTIMATION OF THE MOISTURE CONTENT OF M61 IGNITER,
by Richard M. Abbott, Milton Roth, and Nathan M. Liszt. Nov 62, 11p. incl. illus. table, 5 refs.
Unclassified report

DESCRIPTORS: *Igniters, *Water, Moisture, Potassium compounds, Chlorates, Lead compounds, Thiocyanates, Test equipment, Materials, Determination.

A procedure was developed for determining the mositure content of M61 igniter composition. A 5g specimen is boiled for 2 hours with 100 ml. of a water immiscible solvent such as trichlorethylene, and the moisture is collected in a return-solvent type of distillation receiver. The accumulated moisture and solvent are washed into a beaker with methanol and titrated using the Karl Fischer method. A blank determination is performed concurrently and the moisutre content is calculated from the net titration. Recoveries of weighed amounts of water are quantitative. Moisture contents of samples of igniter composition are in the range of 0.6 - 0.8%. The procedure also appears applicable to the measurement of small percentages of moisture in many other types of mixtures containing compounds that react with Karl Fischer reagent. (Author)

AD-401 390 Div. 4, 10
(TISTM/ODN) OTS price $3.60

Louvain U. (Belgium).
REACTION KINETICS IN FLAMES.
Final technical rept.,
by A. Van Tiggelen. Feb 63, 30p. illus. 15 refs.
(Grant no. AF-EOARDC-62-65)
(AFOSR-4594) Unclassified report

DESCRIPTORS: *Flames, *Reaction kinetics, *Nitrogen compounds, *Gases, Heat of activation, Chemical reactions, Free radicals, Experimental data, Nitrogen, Mixtures, Hydrocarbons, Oxides, Combustion.

Flame propagation velocities and temperatures have been measured in propylene-oxygen mixtures at different mixture strengths and varying dilutions with nitrogen. An activation energy of 40 kcal and a mean molecular weight of chain carriers can be derived from these measurements. The reaction mechanism is discussed, it points out the stability of the C3H5 radical. A comparative study is made of flames propagating in mixtures of nitrous oxide and CH4, C2H6, C3H8, n-C4H10, i-C4H10, C(CH3)4, C2H4, C2H2, C3H6. The overall activation energy of the branching process has been calculated together with the mean molecular weight of the free radicals which are responsible for the propagation of the chain reaction. A reaction mechanism is proposed based on the formation of alkoxy radicals according to R· + N2O yields RO· + N2, followed by RO· + RH yields ROH + R·. (Author)

AD-401 481 Div. 4, 25
(TISTM/TCG) OTS price $1.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
THE HEAT OF FORMATION OF TRISETHYLENEDIAMINE COBALT III PERCHLORATE (TEDCP),
by Charles Lenchitz, Rodolf Velicky, and Benjamin Haywood. Dec 62, 13p. incl. tables, 4 refs. (Picatinny Arsenal technical memo. no. 1113)
Unclassified report

DESCRIPTORS: *Metalorganic compounds, *Cobalt compounds, *Perchlorates, *Organic compounds, *Heat of formation, Heat of reactions, Test methods, Test equipment, Calorimeters, Thermodynamics, Organic compounds, Other.

The heat of formation (delta H sub f) of trisethylenediamine cobalt III perchlorate (TEDCP) was calculated from the reaction: $2(Co(NH_2(CH_2)_2NH_2)_3)(ClO_4)_3 + 3Na_2S$ yields $Co_2S_3 + 6NaClO_4 + 6(CH_2NH_2)_2$; a value of -196 kcal/mole was obtained. The heat evolved from the above reaction was determined in a differential calorimeter. (Author)

AD-401 591 Div. 4
(TISTM/CCH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
KINETICS OF THE DARK REACTION OF THE CHLORINE-HYDROGEN MIXTURE, III AND IV,
by A. I. Rozlovskiy. 1 Apr 63, 39p. incl. illus. tables, refs. (Trans. no. FTD-TT-62-1688 from Russian Periodical, Zhurnal Fizicheskoy Khimii, 30:11 and 12, pp. 2489-2498 and 2713-2723, 1956)
Unclassified report

DESCRIPTORS: *Combustion, *Reaction kinetics, Chlorine, Hydrogen, Mixtures, Flames, Explosions.

AD-401 598 Div. 4, 14
(TISTM/SJR) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
METHOD OF OBTAINING THERMOSTABLE TRIAZINE RUBBER,
by M. P. Krasuskaya and I. L. Knunyants. 14 Mar 63, 3p. (Trans. no. FTD-TT-63-176 from Russian Patent No. 145748 (732082/23-4), pp. 1-2, 25 May 61)
Unclassified report

DESCRIPTORS: *Organic compounds, *Synthetic rubber, Stability, Heat-resistant plastics, Synthesis (Chemistry).

AD-401 683 Div. 4
(TISTM/SJR) OTS price $3.60

Cornell U., Ithaca, N. Y.
KINETICS OF RAPID GAS PHASE REACTIONS. THE ADDITION OF LEWIS ACIDS TO BASES.
Final rept.,
by S. H. Bauer, J. V. Martinez and others.

Feb 63, 1v. incl. illus. tables, 22 refs. (Rept. no. C. U. 7237 and C. U. 6926)
(Contracts Nonr-40130, Proj. NR051242 and N6onr-26417, Proj. NR056242)
Unclassified report

DESCRIPTORS: *Organic compounds, *Chemical reactions, Boron compounds, Fluorides, Diboranes, Eliphatic compounds, Secondary amines, Tertiary amines, Ammonia, Synthesis, Reaction kinetics.

The gas phase addition of Lewis acids, of which the boron trihalides are typical, to Lewis bases, of which the amines are typical, was studied. Since the absolute magnitudes of these rates are difficult to determine with precision over a range of pressures and temperatures, and since the primary interest lies in measurement of the effect of selected molecular parameters on the rates, this research program centered around the measurement of relative rates of addition, taking that of BF3 + N(CH3)3 yields (CH3)3N:BF3 as the reference value. (Author)

AD-401 701 Div. 4
(TISTM/SJR) OTS price $1.60

Massachusetts Inst. of Tech., Cambridge.
VINYL DERIVATIVES OF METALS. XIII. SOME ADDITION REACTIONS OF TRIETHYLPERFLUOROVINYLSILANE. THE F(19) NUCLEAR RESONANCE SPECTRA OF THE TRIETHYLPERFLUOROVINYL DERIVATIVES OF SILICON, GERMANIUM AND TIN, AND OF PERFLUOROVINYLTRIETHOXYSILANE.
Addendum to final report on Organometallic Polymers,
by Dietmar Seyferth, Tadashi Wada and Gary E. Maciel. 19 Oct 61, 14p. incl. table, refs.
(Contract DA 19-129-qm-1277, Proj. 7-93-30-001)
Unclassified report

DESCRIPTORS: *Organic compounds, *Metalorganic compounds, Silanes, Fluorides, Bromides, Chlorides, Nuclear magnetic resonance, Germanium compounds, Tin compounds, Spectra (Infrared), Synthesis (Chemistry).

The reactions of triethylperfluorovinylsilane with bromine, hydrogen bromide, bromotrichloromethane, carbon tetrabromide and trifluoroiodomethane result in Et3SiCFBrCF2Br, Et3SiCFHCF2Br, Et3SiCFBrCF2CCl3, Et3SiCFBrCF2CBr3 and Et3SiCFICF2CF3 respectively. The structures of the hydrogen bromide and bromotrichloromethane adducts were confirmed using NMR spectroscopy. Chlorine does not add across the double bond, but chlorinates ethyl groups instead. The preparations of perfluorovinyltriethoxysilane, triethylperfluorovinylgermane and triphenylperfluorovinylgermane are described. (Author)

AD-401 739 Div. 4
(TISTM/ODN) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THERMAL DECOMPOSITION OF NITROSYL PERCHLORATE,
by V. Ya. Rosolovskiy. 18 Mar 63, 6p. incl. illus. 6 refs. (Trans. no. FTD-TT-63-116 from Russian Journal, Doklady Akademiy Nauk SSSR, 146:1, pp. 115-117, 1962)
Unclassified report

DESCRIPTORS: *Nitrogen compounds, *Perchlorates, Decomposition, Reaction kinetics, Pyrolysis.

AD-401 867 Div. 4, 17, 25
(TISTM/EJH) OTS price $1.60

Aeronautical Research Lab., Office of Aerospace Research, Wright-Patterson Air Force Base, Ohio.
METHOD FOR DETERMINATION OF THE FREE AND TOTAL TITANIUM CONTENTS IN ZrO2-Ti COMPOSITIONS.
Interim technical report on Surface and Interface Phenomena of Matter,
by Ross W. Moshier and Robert Ruh. Jan 63, 14p. incl. tables, 4 refs. (Rept. no. ARL 63-13)
(Proj. 7022)
Unclassified report

DESCRIPTORS: *Titanium, *Titanium compounds, *Volumetric analysis, Dioxides, Chemical analysis, Solids, Solutions, Cermets, Phase studies, High temperature research, Sublimation.

Procedures were developed for the determination of the total Ti content and the free Ti content by chemical analysis. Using these procedures the amounts of total Ti and free Ti were determined in ZrO2-Ti compositions with 0.38, 1.2, 2.0 and 6.4 wt-% Ti. With this data it was possible to determine the stability of the Ti when present in the free state and in solid solution. Total Ti analysis revealed that there is no significant loss of Ti at any firing temperature when the Ti is in solid solution in ZrO2. Above the solubility limit, vaporization of the free Ti begins at 1500 C, and the rate increases with temperature. Free Ti analyses showed that there is virtually no free Ti in compositions below the solubility limit. The amount of free Ti in compositions above the solubility limit was determined. A combination of the data of both analyses revealed the amount of Ti in solid solution in ZrO2. (Author)

AD-401 871 Div. 4
(TISTM/SJR) OTS price $2.60

Massachusetts Inst. of Tech., Cambridge.
ORGANOMETALLIC POLYMERS.
Final rept., 1 Oct 58-31 May 61,
by D. Seyferth. 1 Aug 61, 1v. incl. tables, refs.
(Contract DA 19-129-qm-1277)
Unclassified report

DESCRIPTORS: *Organic compounds, *Aromatic, compounds, Metalorganic compounds, Silanes, Germanium compounds, Tin compounds, Fluorides, Nuclear magnetic resonance, Chromatographic analysis, Spectra (Infrared), Synthesis (Chemistry), Phosphines.

AD-401 887 Div. 4, 14
(TISTM/BRW) OTS price $1.60

Air Force Cambridge Research Labs., Bedford, Mass.
SPECTROGRAPHIC ANALYSIS OF TRACE ELEMENTS IN ALUMINUM OXIDE MATRICES.
Research note,
by John J. Fitzgerald. Jan 63, 9p. incl. illus. tables, 7 refs. (Rept. no. AFCRL-63-3)
(Proj. AF 5620)
Unclassified report

DESCRIPTORS: *Aluminum compounds, Impurities, Spectroscopy, Synthetic stones, Ruby, Standards, Oxides.

Twenty-five trace elements in aluminum oxide matrices are determined by a spectrographic method. The oxide samples buffered with graphite are arced at high amperage and the spectral intensities measured by an external standard,

pure aluminum oxide, excited similarly. The method is convenient, sensitive, precise, and more suited than chemical analysis, which would require an extended, difficult, and complex analytical scheme. It has been used routinely for the analysis of lasers and related materials. The concentration ranges covered for the impurities vary from 0.0001 and 0.0025 up to 0.010. (Author)

AD-401 869 Div. 4
(TISTM/CCH) OTS price $2.60

Cornell U., Ithaca, N. Y.
NUCLEATION OF SILVER ON SODIUM CHLORIDE,
by D. Walton, T. N. Rhodin, and R. W. Rollins.
Nov 62, 17p. incl. illus. table, 5 refs. (Technical rept. no. 7)
(Contract Nonr-40131, Proj. NR 036-035)
Unclassified report

DESCRIPTORS: *Silver, *Sodium compounds, Adsorption, Surface properties, Dissociation, Temperature, Nucleation, Chlorides.

The nucleation rate of silver deposited from the vapor phase onto a sodium chloride substrate was studied as a function of substrate temperature and incidence rate. The results are found to be in agreement with a theory based on the assumption that the critical nucleus is a single atom for high supersaturations and contains three atoms at the lower supersaturations employed. Using the theory, a value of 0.4 ev was obtained for the adsorption energy of silver on sodium chloride. It is also estimated that the activation energy for surface diffusion is less than 0.2 ev, and that the dissociation energy of the cluster of three atoms is 2.1 ev. (Author)

AD-401 932 Div. 4, 7
(TISTM/SJR) OTS price $8.10

Mass. Inst. of Tech., Cambridge.
ELECTROCHEMICAL OXIDATION OF FORMIC ACID,
by Robert Slott.
Jan 63, 169p. incl. illus. tables, 53p. (Scientific rept. no. 5)
(Contract Nonr 184178) Unclassified report

DESCRIPTORS: *Electrochemistry, *Aliphatic compounds, Electrodes, Platinum, Electric potential, Capacitance, Electrolytes, Sulfuric acid, Carbon dioxide, Nitrogen, Hydrogen, Fuel cells, Oxidation

This investigation was undertaken to obtain a better understanding of the mechanism of the electrochemical oxidation of formic acid on a plain platinum electrode. Attention was focused on the unusual voltage behavior observed in formic acid solutions. Experiments were carried out to determine the effect of pretreatment on subsequent electrode performance and to gain insight into the nature of the galvanostatic voltage oscillations observed with formic acid solutions. The effect of electrode pretreatment on chronopotentiometry and current-potential double layer capacitance relationships was determined. Minimum open circuit potentials were obtained as a function of pH in the presence of nitrogen, carbon monoxide, and carbon dioxide. Capacitance-potential curves were obtained at constant potential in H_2SO_4 as a function of formic acid concentration. In the same system capacitance-potential relationships were studied during galvanostatic voltage oscillations. It was concluded that the minimum open circuit potential observed with formic acid on platinum in neutral and acid media is due to the presence of hydrogen on the electrode. The rise of potential at open circuit was found to be caused by the adsorption of an unknown, uncharged organic species on the platinum electrode. Both the hydrogen and the uncharged organic species were formed from the chemical decomposition of formic acid. There were indications this species was CO. (Author)

AD-402 086 Div. 4
(TISTM/AW) OTS price $1.60

Pennsylvania State U. Mineral Industries Experiment Station, University Park.
SYNTHESIS AND I-R SPECTRA OF LOW SPODUMENE,
by Vladimir Blinov and Rustum Roy. 3 Apr 63, 9p. incl. illus. refs. (Technical rept. no. 17)
(Contract Nonr-65620)
Unclassified report

DESCRIPTORS: *Minerals, *Single crystals, Crystal growth, Glass, Nucleation, Infrared spectroscopy, Silicates, Pegmatite, Synthesis (Chemistry).

The alpha (low) form of spodumene ($Li_2O.Al_2O_3.4SiO_2$) has successfully been synthesized reproducibly by nucleating its glass at pressures above 10 kbars below 600 C, and crystallizing above 20 kbars at 800 C. Alpha-Eucryptite can also be grown without mineralizers by this procedure. Differences in the infrared spectra of the alpha and the beta polymorphs of each of the two minerals are interpreted in terms of the coordination changes and could serve for quantitative evaluation of mixtures. (Author)

AD-402 167 Div. 4
(TISTM/AM) OTS price $1.60

General Dynamics/Convair, San Diego, Calif.
ELECTROMOTIVE POTENTIALS.
Rept. on Material - Aluminum - Steel, Alloy,
by A. F. Hooper, J. C. George, and E. E. Keller.
9 Apr 59, 9p. incl. illus. table, 21 refs.
(Rept. no. 8926-146)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Corrosion, *Electrochemistry, *Aluminum alloys, *Alloys, Electrolytes, Electrodes, Ionization potential, Documentation, Steel, Zinc, Polarization, Anodes (Electrolytic cells), Cathodes (Electrolytic cells), Metals.

A literature survey was made on electrochemical corrosion as related to aircraft fabrication materials. Electrochemical corrosion problems and testing methods were emphasized in the literature survey. In addition, the electromotive potentials of several aircraft materials were determined and are presented. (Author)

AD-402 311 Div. 4, 25
(TISTM/REB) OTS price $1.10

California U., Berkeley.
CHEMISTRY OF NATURAL PRODUCTS.
Final rept., Sep 61-Aug 62,
by Henry Rapoport. 1 Mar 63, 8p.
(Grant DA-CML-18-108-G-33)
Unclassified report

DESCRIPTORS: *Alkaloids, *Venoms, *Fishes, Iodates, Hydrogen peroxide, Hydrogen compounds, Iodides, Phosphorus, Chemical reactions, Molecular structure, Shellfish, Oxidation.

Oxidation of dihydrosaxitoxin with periodate proceeds at alkaline pH's with the consumption of one mole of oxidant. The product is a weakly basic amine; no formaldehyde was found. Oxidation of saxitoxin with concentrated H2O2 gives guanidine and beta-guanidinopropionic acid. With dilute H2O2, a new compound, C9H1102N6C1, is obtained. The action of P and HI on ryanodol leads to a gamma-lactone as the main product plus several other crystalline products. The gamma-lactone is most likely a substituted indan on the basis of spectrophotometric studies. Oxidation of ryanodol with periodate proceeds to an oxidation product from which formic and isobutyric acids can be cleaved. (Author)

AD-402 316 Div. 4
(TISTM/AM) OTS price $1.25

Baylor U., Waco, Tex.
THE EFFECT OF ADDITIVES OF ELECTRODEPOSITION AND ELECTRODISSOLUTION OF METALS.
Final rept. on Characterization of Solid Phase and Interphase Phenomena in Crystalline Substances,
by Thomas C. Franklin, Jerry Barrett, and others.
Mar 63, 42p. incl. illus. 147 refs.
(Contract AF 33(657)7485, Proj. 7353)
(ASD TDR 63-212) Unclassified report

DESCRIPTORS: *Electroplating, *Additives, *Electroplating solutions, Electrolytes, Electrodeposition, Cyanides, Sulfates, Anodes, Nickel, Electrolytic polishing, Sulfur compounds, Cadmium.

A preliminary investigation was made of the effect of additives on the electrodeposition of cadmium and on the electrodissolution of nickel. The electrodeposition study was primarily limited to a study of techniques. These techniques included constant current pulses, cyclic voltammetry, microvolumetric measurement of hydrogen evolved, and hydrogen embrittlement. It was found that the current efficiency for the deposition of cadmium varied with concentration of additive in a regular pattern. Using different plating times, different base metals, different current densities, and in stirred and unstirred solutions the additive effects on current efficiency were similar. The electrodissolution study indicated that under some conditions an oxidizing additive acted on the metal in a first order corrosion reaction. This reaction was accelerated by the application of the anodic potential. (Author)

AD-402 341 Div. 4, 25
(TISTM/REB) OTS price $1.60

University Coll., Dublin, Eire.
MOLECULAR ORBITAL THEORY OF ORGANOMETALLIC COMPOUNDS, PART 4. SUBSTITUTION REACTIONS OF TRICARBONYLBENZENECHROMIUM,
by D. A. Brown. 1963, 10p. illus. tables, 15 refs. (Technical rept. no. 6)
(Contract N62558-3560, Proj. NR 051-417)
Unclassified report

DESCRIPTORS: *Metalorganic compounds, *Substitution reactions, Atomic orbitals, Electrons, Energy, Heat of activation, Reaction kinetics, Quantum mechanics, Theory.

It has been shown that the simple empirical molecular orbital theory provides a satisfactory explanation of the charge transfer observed in substituted tricarbonylbenzenechromiums; this theory is extended to a discussion of the substitution reactions of these systems. In particular, the contribution of the pi-electron energy to the activation energy for nucleophilic, radical, and electrophilic substitution of the complex is calculated; these values are compared with those for the corresponding substitution reactions of benzene. The calculations are made for a wide range of parameters in order to test the reliability of the conclusions made on such a theoretical model. (Author)

AD-402 392 Div. 4, 16
(TISTM/SJR) OTS price $1.60

New Hampshire U., Durham.
CHEMICAL SYNTHESES OF ACTINOMYCIN ANALOGS.
Annual rept. no. 1, June 61-June 62,
by Robert E. Lyle, P. S. Halwe and others.
24 Oct 62, 16p. incl. illus. 14 refs.
(Grants 139-R-1 and DA-CML-18-108-61-G-28)
Unclassified report

DESCRIPTORS: *Organic compounds, *Antibiotics, Peptides, Amino acids, Spectra (Infrared), Pharmacology, Synthesis (Chemistry).

The nature of the products of this research required a division of the effort into two sections. One is concerned with the synthesis of heterocyclic carboxylic acids and the second the preparation of polypeptide units. With the exception of the pyridine carboxylic acids the acid derivatives of the other heterocycles were not commercially available. The synthesis of these acids then required either substitution of the carboxyl group on the preformed heterocyclic nucleus or cyclization of a fragment containing the carboxyl group in the starting material. Another phase of this investigation was concerned with a polymerization of amino-acid derivatives in such a way that a hetero-aroyl function was attached at the terminal position of the polypeptide chain. (Author)

AD-402 421 Div. 4
(TISTM/LMH) OTS price $1.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
MAGNESIUM REMOVAL EXPERIMENTS FOR CONTROL OF SCALE IN VC STILLS,
by C. Saturnino. 28 Mar 63, 5p. illus. 4 refs.
(Rept. no. TN-493)
(Proj. Y-R011-01-052)
Unclassified report

DESCRIPTORS: *Evaporators, *Sea water, Magnesium, PH, Control, Ion exchange resins, Inhibition, Distilling plants, Degradation, Separation.

An experimental study was initiated to determine the effect of the concentration of magnesium ion in sea water upon the scaling characteristics in vapor compression stills. An attempt was made to determine the rate of scale formation at reduced magnesium concentrations. The use of an ion-exchange resin was found to be impractical for maintaining a constant value for magnesium. Further investigation depends upon the feasibility of controlling magnesium by controlled precipitation and filtration. (Author)

AD-402 424 Div. 4
(TISTM/REB) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
OXIDATION OF ORGANIC COMPOUNDS,
by S. R. Rafikov, B. V. Suvorov and others.

12 Mar 63, 10p. incl. illus. 12 refs. (Trans. no. FTD-TT 62-1877/from Russian periodical, Izvestiya Akademii Nauk Kazakhskoy SSR, Seriya Khimicheskaya, No. 1 (21), pp. 67-71, 1962.
Unclassified report

DESCRIPTORS: *Organic compounds, Oxidation, Ammonia, Chemical reactions, Catalysts, Tin compounds, Vanadates, Synthesis.

The reaction of oxidizing ammonolysis of m-xylene with a catalyst of stannous vanadate was studied. It has been shown that the basic product of the process is isophthalodinitrile. With a hydrocarbon:air:ammonia ratio of 1:80:3, contact period of 0.4 sec, and reaction temperature of 390 deg its yield reached 60% of that theoretically calculated for the substance taken. The reaction studied may be recommended as a method of synthesizing the dinitrile of isophthalic acid. (Author)

5. COMMUNICATIONS

AD-401 167 Div. 5, 6, 12, 8
(TISTP/PCR) OTS price $6.60

Philco Corp., Palo Alto, Calif.
ADVENT PROGRAM.
Final rept.
30 Jan 63, 1v. incl. illus. (Rept. no. WDL-TR1995)
(Contracts AF 04(647)828 and AF 04(695)112)
Unclassified report

DESCRIPTORS: *Communication satellites (Active), *Radar tracking, *Telemeter systems, *Command and control systems, Checkout equipment, Specifications, Instruction manuals, Reliability, Logistics, Ground support equipment, Orbit trajectories, Radar equipment, Radar stations.

An historical account of Philco WDL's participation in the Advent Program is presented. Although unpredictable events prevented the Advent Program from becoming an operational system, the program did provide an example of engineering management cooperation. Numerous examples of this cooperation are reported. The name Advent will no longer be heard; however, the tracking, telemetry and command equipment developed and delivered by Philco is presently finding its way into many other satellite control systems destined to achieve operational status. (Author)

AD-401 187 Div. 5, 15
(TISTP/FEM) OTS price $4.60

Mathematics Research Center, U. of Wisconsin, Madison.
ELECTRIC WAVE PROPAGATION ON NON-UNIFORMCOUPLED TRANSMISSION LINES
by Calvin H. Wilcox. Jan 63, 47p. 21 refs.
(MRC Technical summary report no. 376)
(Contract DA-11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Electric currents, *Electric potential, Transmission lines, Telephone lines, Integral transforms, Partial differential equations, Matrix algebra, Differential equations, Functions, Coupling circuits, Electrical impedance, Standing-wave ratios, Propagation.

The propagation of electric currents and voltages along a pair of wires over a ground plane is studied. The system is assumed to be non-uniform; i.e., the self and mutual inductances and capacitances vary along the wires. The existence and uniqueness of an electric wave having prescribed initial values is shown to follow from recent results of the author on symmetric hyperbolic systems of partial differential equations. A construction for this solution is given in the case of a coupler (i.e., a pair of wires which are non-uniform and coupled over a portion of their length only). This coupler problem is reduced to a two-point boundary value problem, and the latter is reduced to a pair of initial value problems, one of which involves a matrix Riccati equation. A novel feature of the work is an a priori estimate which guarantees that a solution of the (non-linear) matrix Riccati equation exists on the whole line. (Author)

AD-401 238 Div. 5
(TISTM/DGH) OTS price $1.10

Southern Research Inst., Birmingham, Ala.
(No title).
Monthly progress rept.,
by Alvin N. Bird, Jr. 11 Apr 63, 5p.
(Contract DA 18-108-amc-32-A)
Unclassified report

DESCRIPTORS: *Aerosols, *Chemical warfare agents, Television cameras, Television display systems, Cathodes, Platinum, Electrochemistry, Particle size.

Development of instruments for measuring particle size and concentration of chemical agents was continued during March. A breadboard model flash camera was assembled and experimental evaluation was started. Two special electrochemical cells were made to explore the relation between the response time of the cell and the thickness of the oxime layer. An analysis of thermal precipitation was made to determine the basic factors for designing a thermal precipitator for chemical agents. This report gives the results of the experimental work with the camera and the cells, and a summary of the analysis of the thermal precipitator. (Author)

AD-401 440 Div. 5
(TISTP/PCR) OTS price $5.60

ITT International Electric Corp., Paramus, N. J.
STRATEGIC AIR COMMAND CONTROL SYSTEM (465L).
Monthly test progress rept., 20 Dec 62-20 Jan 63,
by J. R. Lewellyn. 20 Feb 63, 48p. incl. illus. 16 refs. (Rept. no. IEC 20130)
(Contract AF 19(626)8)
(ESD TDR 63-223) Unclassified report

DESCRIPTORS: *Communication systems, *Strategic Air Command, Data storage systems, Electronic equipment, Test equipment (Electronics), Reliability, Display systems, Data transmission systems, Data processing systems, Command and control systems, Combat information centers.

The report contains a brief description of the 465L System and subsystems, information on test status, and summaries of other activities which bear on test progress. Test status and current progress is presented by milestones as they are grouped under the appropriate subsystem or system configuration. Principal subjects in this report are test documentation, First Article testing, in-plant testing, and on-site testing. If specific problems are evident, the facts are presented along with recommended solutions. (Author)

AD-401 817 Div. 5
(TISTP/MC) OTS price $4.60

Kansas U., Lawrence.
OPTIMUM SYNTHESIS OF SAMPLED-DATA SYSTEMS WITH NON-STATIONARY RANDOM INPUTS.
Master's thesis,
by Robert H. McCamish. Feb 63, 43p. incl. illus. 16 refs.

Unclassified report

DESCRIPTORS: *Communication theory, Data processing systems, Errors, Sampling, Statistical functions, Statistical analysis.

This thesis presents a mean amplitude-set-time-weighted error optimization criterion for use in synthesizing an optimum sampled-data system whose input is a non-stationary random signal corrupted by additive noise. The criterion is applied to both a time-invariant system and a time-variant system. Physically realizable solutions for the optimum system are derived in each case. The following is concluded. Although the square of the system error was used for the amplitude weighting function, this selection is not the best in many cases. A similar problem arises in the selection of the time-weighting function and the subset-weighting parameter. No general procedure known will take the place of a designer's experience in the selection of these weighting functions. Many factors, including the characteristics and complexity of the system, and cost, must be considered in deciding the type of weighting function to be used. A logical study of these factors is a desirable subject for further work. The mathematical rigor was reviewed. The author justifies necessary interchange of orders of summation by stating that most summations and integrations arising in connection with physical systems are absolutely convergent.

AD-401 845 Div. 5
(TISTP/MC) OTS price $3.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
SOME QUANTUM CONSIDERATIONS FOR SUBMILLIMETER AND OPTICAL COMMUNICATIONS.
Technical rept.,
by D. P. Harris and W. R. Ramsay. Jan 63, 25p. incl. illus. 11 refs. (Rept. no. 6-90-63-19)

Unclassified report

DESCRIPTORS: *Communication theory, *Light communication systems, Pulse modulation, Frequency modulation, Digital systems, Signal-to-noise ratio, Quantum mechanics.

Error probabilities and bounds on information transmission capacities are determined for some communications techniques applicable to channels with significant quantum disturbances. Consideration is given to the performance of systems using ideal energy detection with and without signal preamplification. The consequences of using signals of limited coherence are evaluated in several cases. It is found that quantum disturbances do not inherently limit the information that can be communicated over a channel in the manner that additive noise does. Where additive noise is negligible, it has been found that the performance of systems using elementary pulse-position (and frequency-shift) modulation schemes and photon-counting detectors can be made insensitive to imperfections in signal coherence. Furthermore, the potential performance of these systems (in terms of power required per unit of information-transfer rate) is potentially superior to that offered by any system of modulation which involves received-signal amplification prior to detection. (Author)

AD-401 920 Div. 5, 16
(TISTB/AW) OTS price $1.60

Air Force Cambridge Research Labs., Bedford, Mass.
EXTRACTION OF PITCH FROM THE TRACHEA,
by Harold C. Porter. Feb 63, 10p. incl. illus. 3 refs. (Rept. no. AFCRL 63-24)
(Proj. 4610)

Unclassified report

DESCRIPTORS: *Voice communication systems, *Speech transmission, Transducers (Acoustic), Throat, Test methods, Design, Instrumentation, Speech, Synthesis, Pitch discrimination.

For decades speech researchers have recognized that accurate pitch information is prerequisite to the synthesis or reconstitution of speech that has been broken into its basic parts for any reason, such as communication over restricted bandwidth media. In a series of experiments investigating tracheal pitch extraction according to a methodology suggested in a Japanese paper, reasonably accurate real-time pitch extraction was achieved. The method has a limitation in that the talker must wear a special appliance. (Author)

AD-402 113 Div. 5
(TISTP/TL) OTS price $7.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
ERROR CONTROL IN DIGITAL COMMUNICATION,
by Arnfinn Moe Manders. Jan 63, 73p. incl. illus. 13 refs. (Research rept. no. PIBMRI-1076-62)
(Grant AFOSR-62-295)

Unclassified report

DESCRIPTORS: *Digital systems, *Errors, *Telephone communication systems, *Data transmission systems, *Signals, Modulation, Detection, Statistical distribution, Matrix algebra, Sequences, Numerical analysis, Signal-to-noise ratio, Computers, Circuits, Control, Communication systems, Probability, Interference.

A solution to the problem of obtaining the maximum transmission rate subject to a fixed permissible error rate and a fixed equipment complexity is studied. The method by which this is accomplished is to use an error correcting device (ECD) that examines the signal for signs that a burst of impulse noise is likely to have occurred. The bits that are in doubt are erased and replaced by use of a two-dimensional parity check. This method allows a few errors to pass undetected by the ECD and will therefore give a small but definite probability of errors in the presence of noise bursts. Some of these errors can be corrected if the code used has some error correction capability. The two-dimensional code used is to break the received string of bits in sequences that are used as rows. By making the rows sufficiently long the probability that one noise burst will cause more than one error in any column can be made very small. A figure of merit, M, is defined by which different transmission systems can be classified as to burst length. Given a permissible probability of error and the maximum channel capability to ECD will be constructed in a way maximize the effective signaling rate. (Author)

AD-402 426 Div. 5, 8
(TISTE/JBM) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
USE OF EXPERIMENTAL DATA IN CALCULATING THE RELIABILITY OF RADIOELECTRONIC EQUIPMENT, BASED ON THE POISSON DISTRIBUTION,
by G. B. Linkovskiy. 18 Mar 63, 5p. (Trans. no. FTD-TT-63-38 from Russian Periodical, Izvestiya Vyschikh Uchebnykh Zavedeniy. Priborostroyeniye, No. 5, pp. 43-46, 1961)
Unclassified report

DESCRIPTORS: *Radio equipment, Statistical processes, Electronic equipment, Probability, Experimental data, Reliability (Electronics).

AD-402 454 Div. 5
(TISTE/CAM) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
AN OPTIMUM IDENTIFYING DEVICE FOR SYSTEMATIC CODES AND CERTAIN TYPES OF CHANNELS,
by I. I. Grushko. 20 Mar 63, 10p. incl. illus. table, 4 refs. (Trans. no. FTD-TT-63-248 from Izvestiya Akademii Nauk SSSR, OTN, Energetika i Avtomatika, No. 3, pp. 105-109, 1961)
Unclassified report

DESCRIPTORS: *Radio signals, *Coding, *Communications theory, Probability, Detectors, Matrix algebra, Series, Sequences, Identification.

6. DETECTION

AD-401 109 Div. 6
(TISTW/PCR) OTS price $18.50

RCA Defense Electronic Products, Burlington, Mass.
INVESTIGATION OF TRANSPORTABLE SEARCH RADAR AND SIF EQUIPMENT.
Final rept., 4 Apr-30 Sep 62,
by J. Lauginiger, E. Reid, and R. Morin.
30 Sep 62, 1v. incl. illus. tables.
(Contract AF 19(604)8020, Proj. 2124)
(AFCRL-62-700) Unclassified report

DESCRIPTORS: *Search radar, Identification systems, Electronic equipment, Communication systems, Power supplies, Air conditioning equipment, Radar receivers, Radar transmitters, Modulators, Radar antennas, Microwave equipment, Ground-controlled approach radar, Microwave communication systems, Atmospheric refraction, Coding, Circuits, Shelters, Site selection, Traffic control systems, Ultrahigh frequency, Radar antijamming, Mobile.

The purpose of the project was to investigate transportable search radar and SIF equipments for application to the purposes of the Mobile ATC/Communication Facility -- more commonly known as Augmented Four Wheels. A thorough survey of the field of potentially applicable search radar and SIF equipments was undertaken. Available equipments were evaluated against a specific performance criterion, and five equipment systems were recommended as applicable to the Augmented Four Wheels program. Each of the five search radar systems was critically evaluated against Air Traffic Control criteria for the Quick Reaction Posture requirement of the Air Force. Remote control requirements for the search radar and other subsystems, within the Augmented Four Wheels System complex, were thoroughly investigated. Microwave link equipments were evaluated, and specific performance characteristics were defined for use in the Augmented Four Wheels System. (Author)

AD-401 161 Div. 6
(TISTP/FEM) OTS price $19.75

U. of Texas, Austin.
GUIDE TO THE SELECTION OF ACOUSTIC FILTERS FOR LIQUID-FILLED SYSTEMS,
by E. L. Hixson, J. V. Kahlbau and D. G. Galloway. Sep 62, 328p. incl. illus. tables, 28 refs. (Acoustical rept. no. 202)
(Contract NObs-86165, Proj. SF013-11-01)
Unclassified report

DESCRIPTORS: *Acoustic filters, Selection, Design, Acoustic equipment, Attenuation, Liquids, Pipes, Noise, Water tanks, Handbooks.

Passive, dissipationless acoustic filters for attenuating noise in liquid-filled piping systems are analyzed as irregular transmission lines. Equations for calculating a theoretical transmission loss for filters are developed. These equations are then applied to a variety of filters of the following types: (1) side branch filters, (2) expansion chamber filters, (3) combination filters, and (4) Quincke tube filters. Graphical aids for use in finding filter parameter values are given along with filter design examples. Principal results obtained during the program of experimental investigation of acoustic filters at Defense Research Laboratory are summarized. (Author)

AD-401 193 Div. 6, 15
(TISTP/MFA) OTS price $1.60

Army Electronics Research and Development Activity, White Sands Missile Range, N. Mex.
A METHOD FOR USING MEASURED RATE TO IMPROVE RADAR RANGE RATE,
by William L. Shepherd. Feb 63, 7p. (Rept. no. ERDA-4)
(DA Proj. 1-G-2-50206-D-241)
Unclassified report

DESCRIPTORS: *Radar signals, *Ranges (Distance), *Polynomials, Simultaneous equations, Least squares method, Measurement, Numerical analysis.

Two least squares polynomial methods for using radar range rates to obtain improvement of radar range are given. One method involves integration of smoothed range rate; the other is a modification of the interpolating polynomial fitting both range and range rate. (Author)

AD-401 207 Div. 6
(TISTP/MB) OTS price $23.50

Denver Research Inst., Colo.
BALLOON FLIGHT OF JULY 5, 1962.
Flight data rept. no. 6.,
by David G. Murcra, James N. Brooks and others.
15 Mar 63, 454p. incl. illus.
(Contract AF 33(616)7633)
Unclassified report

DESCRIPTORS: *Infrared radiation, Radiometers, Instrumentation, Meteorological balloons, Infrared detectors, Measurement.

The results obtained on a balloon flight made with an automatic programmed radiometer system

are presented. The equipment was launched from Ft. Wainwright, Alaska, July 5, 1962. The radiometer was equipped with a liquid-oxygen-cooled InSb cell as a detector, and measurements were made of the infrared background radiation in various wavelength intervals between 1.8 to 5.0 microns. (Author)

AD-401 317 Div. 6
(TISTP/GRW) OTS price $1.10

Aerospace Information Div., Washington, D. C.
METEOR TRAIL OBSERVATIONS (COMPREHENSIVE REPORT)
25 Mar 63, 7p. 3 refs. (AID Rept. P-63-40)
Unclassified report

DESCRIPTORS: *Meteors, *Radar tracking, Radar equipment.

AD-401 707 Div. 6
(TISTW/JEA) OTS price $7.60

Motorola Inc., Scottsdale, Ariz.
RADAR DATA TRANSFER SYSTEM FOR AN/APS-94 RADAR SURVEILLANCE SET.
Final rept. (Addendum), Aug 60-Sep 62.
by Richard Boileau. Sep 62, 1v. incl. illus. tables.
(Contract DA 36-039-sc-77999)
Unclassified report

DESCRIPTORS: *Search radar, *Data processing systems, Video map matching, Coding, Circuits, Voice communication systems, Air conditioning equipment, Reliability, Radio receivers, Antennas, Antenna radiation patterns, Radar equipment, Combat surveillance, Radar equipment.

The product-improved changes made to the Radar Data Transfer System are presented. The video mixing was changed from amplitude sharing to time sharing, and there is also a change in the scan rate of the Encoder. The necessary circuit changes in the Decoder, to make it compatible with the Encoder, are described. The ratios and antenna used for voice and data communication were studied, and the changes made to improve them are discussed. Addition of air conditioners to the ground station is described, and the redesign of the Processor to make it leakproof is discussed. Photographs of the new equipment are included, showing the new antennas and the other changes. Minor changes made to the equipment in the interest of improved reliability are also discussed. Recommendations to further improve the operation of the Data Transfer System are given. (Author)

AD-401 923 Div. 6, 25
(TISTP/RD) OTS price $11.00

General Electric Co., Philadelphia, Pa.
INFRARED TRANSMISSION AND BACKGROUND RADIATION BY CLEAR ATMOSPHERES,
by T. L. Altshuler. 1 Dec 61, 1v. incl. illus. 38 refs. (Rept. no. 61SD199)
Unclassified report

DESCRIPTORS: *Infrared radiation, Infrared detectors, Infrared pulses, Atmosphere, Absorption, Background, Sky brightness, Gases, Haze, Tables, Ozone, Wave transmission.

Procedures are presented for determination of the atmospheric transmission of infrared and sky background for clear weather. Methods for determining the geometry of an infrared path with respect to the Earth, for obtaining the amount of infrared absorbing gases within the path, and for calculating the transmission and background radiation of those gases are covered. (Author)

AD-402 139 Div. 6, 8
(TISTP/PCR) OTS price $1.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
SYNCHRONIZATION OF TRACKING ANTENNAS.
Rept. no. 6 on ARPA Satellite Fence Series,
by Ralph E. A. Putnam. Sep 59, 19p. incl. illus. table (Technical note no. 1278)
Unclassified report

DESCRIPTORS: *Radar antennas, *Radar tracking, Detection, Doppler radar, Antenna radiation patterns, Radar receivers, Radar transmitters, Circuits, Servomechanisms, Errors, Synchronization (Electronics), Satellites (Artificial).

A proposal to adopt sky-scanning techniques for the detection of passive satellites using doppler principles is dependent on the ability to synchronize sweeping fan-shaped beams and to maintain them co-planar to within ± 1 degree for transmitter and receiver spacings up to 1000 miles. The discussion mentions types of antennas under consideration, covers alternative synchronization methods, indicates sources and possible magnitudes of synchronization errors, and leads to the conclusion that antenna sweep synchronization under the requirements specified is entirely practicable. (Author)

AD-402 218 Div. 6, 12
(TISTA/GEC) OTS price $11.00

Philco Corp., Palo Alto, Calif.
SPECIAL PARAMETER TRACKING SIMULATION STUDY LOW ALTITUDE SATELLITE. VOLUME IV.
Technical documentary rept.
22 Apr 63, 1v. incl. illus. tables (Rept. no. WDL-TR1943, vol. 4)
(Contract AF 04(695)278)
Unclassified report

DESCRIPTORS: *Satellites (Artificial), Simulation, Orbital trajectories, Tables, Radar stations, Radar tracking, Mathematical prediction, Low-orbit trajectories, Tracking.

This report presents results in satellite position and velocity accuracy as a function of tracking data, number of passes, station latitude separation, and other pertinent variables in graphical form. The information in this report, which is to be used as a design tradeoff handbook for error propagation in orbit determination, was obtained by using the Co-Variance (Fixed Bias) Simulator Program and a detailed list of AFSSD-supplied tradeoff parameters. (Author)

AD-402 352 Div. 6
(TISTP/RD) OTS price $7.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
COUNTER MODELS AND APPLICATIONS TO DETECTION PROBLEMS,
by Hans Zweig. 12 Apr 63, 73p. 20 refs.
(Technical rept. no. 87)
(Contract Nonr-22552, Proj. NR 342-022)
Unclassified report

DESCRIPTORS: *Coincidence counting, *Detection, *Detectors, Mathematical models, Analysis of variance, Statistical processes, Integral transforms, Counting methods, Theory.

The quantum efficiency is derived of a variety of detectors for which mathematical models already exist and to develop new models for some physical situations which can be examined in this

light. A summary of the models which will be analyzed is given. The applications of these models to specific detection problems is indicated. The methods of estimating the parameter of interest and the efficiency of the estimates is defined. A summary is presented of known dead time counter models and their quantum efficiency is evaluated. A new class of counters, called coincidence counters, is introduced and evaluated. (Author)

AD-402 356 Div. 6, 20
(TISTP/MC) OTS price $1.60

Army Electronics Research and Development Agency, Fort Monmouth, N. J.
THE MEASUREMENT OF HIGH INTENSITY GAMMA FLUXES WITH VAC ION GAUGES,
by Basil Markow. Mar 63, 16p. incl. illus. (Technical rept. no. 2342)
Unclassified report

DESCRIPTORS: *Radiation measurement systems, *Gamma counters, Radiation measurement systems components, Gamma rays, Detection, Secondary emission, Ionization gages.

The need for a readily available gamma detector, capable of measuring the highly intense and rapidly changing fluxes of pulse sources, is filled with the use of a commercially available off-the-shelf item, the vac ion gauge, and an easily constructed cable connector. (Author)

AD-402 367 Div. 6, 2
(TISTW/JEA) OTS price $1.10

American Meteorological Society, Boston, Mass.
THE PROBLEM OF SELECTING A RADAR TRANSMITTER FOR RADAR OBSERVATION OF METEOR TRAILS,
by F. J. Peregudov, tr. by Myron Ricci. Sep 62, 3p. incl. table, 5 refs. (Trans. no. T-R-397 from Akademiia Nauk SSSR, Komissia po Kometam i Meteoram Biulleten, 2:44-45, 1958)
(Contract AF 19(604)6113)
Unclassified report

DESCRIPTORS: *Radar transmitters, Radar stations, Meteors, Stability, Reliability, Drift, Measurement, Feasibility studies, Very high frequency.

7. ELECTRICAL EQUIPMENT

AD-401 163 Div. 7
(TISTM/PCR) OTS price $9.60

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
ENGINEERING RESEARCH STUDY OF FUEL CELL POWER PACK.
Report for 1 July 62-31 Jan 63 on Phase 2, by R. Drushella and R. Susnar. 28 Feb 63, 52p. illus. tables.
(Contract DA-49-186-502-ORD-1057)
Unclassified report

DESCRIPTORS: *Fuel cells, Hydrogen, Oxygen, Checkout equipment, Tests, Temperature, Life expectancy, Pressure regulators, Valves, Voltage regulators, Circuits, Modules (Electronic), Power supplies, Effectiveness.

A hydrogen-oxygen 1.5 KW fuel-cell power pack was built and evaluated with respect to operational characteristics and operational life as influenced by environmental and operational conditions. Material and energy balances were made on the power pack. The purpose of the evaluation was to isolate and define system engineering research problems. (Author)

AD-401 183 Div. 7, 8
(TISTM/CCH) OTS price $10.10

IBM Command Control Center, Federal Systems Div. Kingston, N. Y.
PLANAR INTEGRATION OF THIN FILM FUNCTIONAL CIRCUIT UNITS.
Final rept., 1 May 61-31 Dec 62, by R. L. Bullard, W. N. Carroll and others. 31 Dec 62, 125p. incl. illus. tables, 9 refs.
(Contract DA-36-039-sc-87246, Proj. 3G26-14-001)
Unclassified report

DESCRIPTORS: *Integrated circuits, *Thin films, Vapor plating, Semiconductor, Vacuum apparatus, Environmental tests, Resistors, Test methods, Chemical milling, Coatings, Counting methods, Manufacturing methods.

This report summarizes the design, history of development, and final processes used in the performance of each of the three phases of the program: integration techniques, process controls, and functional assemblies. Details are presented concerning the equipment used, the methods selected, the specifications established and the evaluations performed. Descriptions of the solder tinning method, solder reflow process, and equipment used to attach functional devices to multilayer thin film circuit panels are presented. A description of the vacuum equipment used to fabricate the thin film circuit panels is presented with details concerning masking techniques, instrumentation, and process control. A detailed section on the latest process evaluation is included. The electrical, logical and mechanical design of the functional assemblies is described as well as the fabrication steps necessary to construct these units. Electrical, environmental, and mechanical test data is presented for both functional assemblies and solder attachment test assemblies, along with details concerning the test procedures used and the analysis of the data obtained. (Author)

AD-401 198 Div. 7
(TISTA/GEC) OTS price $9.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
RADIATION EFFECTS ON SEMICONDUCTORS AND SEMICONDUCTING MATERIALS: AN ANNOTATED BIBLIOGRAPHY,
comp. by Helen B. McCormick. Apr 63, 109p. (Special bibliography no. SB-62-47; Rept. no. 8-19-62-15)
(Contract AF 04(647)0787)
Unclassified report

DESCRIPTORS: *Semiconductor devices, *Semiconductors, *Bibliographies, Transistors, Diodes (Semiconductor), Electrical properties, Magnetic properties, Optical properties, Nuclear spins, Photoconductivity, Germanium, Silicon, Abstracts, Solid state physics, Magnetic moments, Nuclear magnetic resonance, Radiation effects.

An annotated bibliography on the radiation changes in semiconducting devices, materials and properties is presented. Reports concerning the mechanisms by which these changes come about are included. Part I is devoted to radiation effects as evidenced on specific semiconductor devices (diodes and transistors) and to a general treatment of semiconductors in the radiation environment. Part II deals with semiconducting

materials as affected by radiation - changes in electrical, magnetic and optical properties; annealing of radiation damage and radiative recombination; electron spin resonance; photoconductivity induced by radiation. The semiconducting materials reported are germanium, silicon, and compound semiconducting materials, exclusive of the alkali halides. Organic semiconductors have not been included. This selective bibliography reflects the technical literature issued during the time period of January 1960 - July 1962. (Author)

AD-401 359 Div. 7
(TISTM/AMS) OTS price $2.60

Mallory, P. R. and Co., Indianapolis, Ind.
CELL EQUALIZATION TECHNIQUES.
Quarterly technical progress rept. no. 2,
by W. D. Loftus. 1 Apr 63, 12p. illus. 4 refs.
(Contract AF 33(657)8749, Proj. 8173)
Unclassified report

DESCRIPTORS: *Spacecraft, *Batteries and components, *Alkaline cells, Semiconductors, Silicon, Germanium, Nickel, Cadmium, Gold, Solar cells, Circuits, Experimental data, Reliability, Power supplies.

Contact resistance to silicon p-n junction structures was reduced significantly by adjustment of process procedures and the addition of a gold plating step. Optimum nickel sintering temperature was determined to be 500 C; lowest values of device resistance were obtained by overplating the nickel with gold. Work was done on lower resistivity starting material. Characteristic slopes of 5 X 1000 amp per volt per sq in. were obtained from 0.005 ohm-cm silicon. Specific voltage as a function of resistivity was not demonstrated in the case of germanium. Cell equalizers and anti-reversal devices were designed to operate with the 3.2 ampere hour nickel cadmium system. Three experimental battery charging circuits using these devices were fabricated and operated. One sample test set was delivered to Aeronautical Systems Division for evaluation. (Author)

AD-401 403 Div. 7
(TISTE/JBM) OTS price $1.60

Aeronautical Electronic and Electrical Lab.,
Naval Air Development Center, Johnsville, Pa.
PROPOSED SPECIFICATION, REGULATOR, VOLTAGE, STATIC, 28-VOLT DIRECT CURRENT GENERATOR, GENERAL SPECIFICATION FOR PHASE REPORT,
by A. Laverty. 14 Mar 63, 14p. incl. illus.
(Rept. no. NADC-EL-6305)
Unclassified report

DESCRIPTORS: *Voltage regulators, *Generators, *Naval aircraft, Direct current, Test methods, Electric potential, Specifications.

AD-401 585 Div. 7
(TISTE/OHD) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A CAPACITANCE D-C GENERATOR OPERATING ON A NEW PRINCIPLE,
by A. A. Bal'chitis. 27 Mar 63, 18p. incl. illus. 2 refs. (FTD-TT-61-539 from Russian Periodical, Izvestiya Vysshikh Uchebnykh Zavedeniy Elektromekhanika, no. 10, pp. 35-43, 1959)
Unclassified report

DESCRIPTORS: *Generators, *Electric power production, Theory, Electric fields, Electric potential, Electric insulation, Design, Capacitance, Direct current.

A capacitance machine operating on a new principle, based on the induction of a current in a conductor moving in an electric field according to the law of current induction, permits the development of new type of machine and, in particular, a d-c machine. A feature of this machine, different from those capacitance machines known to us, is the simplicity of construction, since there is no commutator in this machine. This article is limited to the consideration of a d-c capacitance generator with independent excitation from an external source. However, by filling the operating gap of the machine (or part of it) with an electret the machine should acquire the ability to become self-excited and, analogous to induction machines, can be built for a circuit of parallel, series, or mixed excitation. What little is already known about a capacitance generator of the new type permits the assertion that a machine of this type will be widely used, particularly where high and super-high voltages are needed and also where a high-speed electric generator is required for connection with the primary mover without reducing gears. (Author)

AD-401 586 Div. 7
(TISTE/OHD) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
DISCUSSION OF THE ARTICLE ''CAPACITANCE D-C GENERATOR OPERATING ON A NEW PRINCIPLE'',
by A. F. Kalganov and L. S. Polotovskiy.
27 Mar 63, 14p. refs. (Trans. no. FTD-TT-61-540 from Russian periodical, Izvestiya Vysshikh Uchebnykh Zavedeniy, Elektromekhanika, No. 4, pp. 129-133, 1960)
Unclassified report

DESCRIPTORS: *Generators, *Electric power production, Theory, Electric potential, Electric fields, Rectifiers, Effectiveness, Analysis, Capacitance, Direct current.

Noting certain correct conclusions of the author of the article ensuing from the general principle of the operation of a capacitance electrostatic generator, it is unfortunately impossible not to note a number of inaccuracies and errors permitted by the author that are of basic importance in estimating the actual state of the given problem and its technological realization.

AD-401 666 Div. 7, 17
(TISTM/BRW) OTS price $5.60

Armour Research Foundation, Chicago, Ill.
STRESS DEPENDENT INTERACTIONS BETWEEN CESIUM AND OTHER MATERIALS.
Summary rept., 15 Feb 62-15 Feb 63,
by David W. Levinson. 22 Mar 63, 55p. incl. illus. tables, 14 refs. (Rept. no. ARF-B215-12)
(Contract Nonr-344100)
Unclassified report

DESCRIPTORS: *Thermionic converters, *Liquid metals, Alloys, Metals, Ceramic materials, Brittleness, Surface active substances, Mercury, Brass, Fracture (Mechanics), Aluminum alloy, Stainless steel, Molybdenum, Titanium, Niobium, Tantalum, Silver solders, Tungsten, Nickel, Tensile properties, Ductility, Mechanical properties, Materials, Cesium.

Division 7 - ELECTRICAL EQUIPMENT

Metals and alloys germane to thermionic energy converter usage were screened for embrittlement by liquid cesium metal. The results of the screening evaluations are reported and techniques are described for more detailed studies of ceramics and susceptible metals. Definite reductions in tensile ductility were observed for 302 stainless steel and molybdenum. Bend ductility was lowered in the cases of unalloyed titanium, titanium-6 aluminum -4 vanadium alloy, columbium, tantalum and silver-copper eutectic solder. Some difficulty in reproducibly wetting samples was evident throughout the study. Slightly contaminating the cesium with oxygen (or water) was observed to increase cesium wettability markedly. (Author)

AD-401 699 Div. 7
(TISTM/AMS) OTS price $2.60

Harshaw Chemical Co., Cleveland, Ohio.
LARGE AREA THIN FILM CADMIUM SULFIDE SOLAR CELL ARRAY INVESTIGATION.
Quarterly technical progress rept. no. 2, 15 Dec 62-15 Mar 63,
by J. C. Schaefer, G. A. Wolff, and E. R. Hill. 21 Mar 63, 1v. incl. illus. tables, refs.
(Contract AF 33(657)9975, Proj. 8173)
Unclassified report

DESCRIPTORS: *Solar cells, *Thin films (Storage devices), *Cadmium compounds, Solar panels, Loading (Mechanics), Tests, Coatings, Electrodeposition, Plastics, Molybdenum, Shock resistance, Glass, Vibration, Acrylic resins, Acceleration, Experimental data, Space environmental conditions, Copper, Silver, Nickel, Gold, Crystals, Crystal growth, Manufacturing methods, Films, Sulfides.

Effort was directed toward the completion and and testing of four orbital test panels. Temperature, shock, acceleration, and sinusoidal and random or white noise vibration tests were conducted. No detrimental cell effects were noted. The panels were tested under tungsten light and sunlight, and were found to have efficiencies of 2.4 to 2.9% with power-to-weight ratios of 9.2 to 12.5 watts per pound. Various graphs indicating expected performance in space are included. Uniform coatings of CdS were electrophoretically deposited on molybdenum substrates from nonaqueous solutions. New plastics and collector grid materials were tested. Pole figure techniques are being applied to films deposited on various substrates to determine the effect of substrates on grain orientation. Studies of grain orientation were continued using light-figure and x-ray diffraction techniques. (Author)

AD-401 718 Div. 7
(TISTE/OHD) OTS price $8.10

Chance Vought Corp., Dallas, Tex.
INVESTIGATION OF CONTACTLESS SWITCHING CONCEPTS FOR APPLICATION TO AIRCRAFT ELECTRICAL SYSTEMS.
VOLUME I - AIRCRAFT SYSTEMS REQUIREMENTS.
Final engineering rept. on Phase 1, 11 June 62-11 Mar 63,
by L. D. Dickey and A. J. Marek. 11 Mar 63, 85p. incl. illus. tables, 16 refs. (Rept. no. 2-53727/3R449-1)
(Contract NOw 62-0944-c)
Unclassified report

DESCRIPTORS: *Electric switches, *Power equipment; Electronic switches, Design, Transistors, Specifications, Feasibility studies, Airborne, Semiconductor devices.

A study program was conducted to determine the factors that must be considered in the development of contactless switching devices and assemblies for performing the functions presently accomplished by conventional electromechanical switching devices. Problem areas and semiconductor characteristics are discussed in light of aircraft electrical system requirements so that design criteria can be established. A chart comparing characteristics of typical electromechanical switching components to the contactless switching concept is presented. Conclusions are offered concerning the factors to be considered in the development of contactless switching devices and assemblies to be compatible with present and anticipated aircraft electrical system requirements. These factors are discussed for devices and assemblies which will perform the functions of relays, circuit breakers and switches; including switching and control of the primary bus. (Author)

AD-401 846 Div. 7
(TISTM/AMS) OTS price $3.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
NEW CATHODE-ANODE COUPLES USING NONAQUEOUS ELECTROLYTE.
Quarterly technical progress rept. no. 2,
by H. G. Bauman, J. E. Chilton, and G. M. Cook. 15 Apr 63, 30p. incl. illus. tables (Rept. no. 2-02-63-2)
(Contract AF 33(616)7957, Proj. no. 8173)
Unclassified report

DESCRIPTORS: *Batteries and components, Electrolytic cells, Lithium, Silver compounds, Chlorides, Oxidation, Electrochemistry, Anodes (Electrolytic cells), Cathodes (Electrolytic cells), Silver, Electrolytes, Thickness, Graphite, Tests, Design, Electrodes.

AD-402 071 Div. 7, 12
(TISTE/CAM) OTS price $4.60

Monsanto Research Corp., Dayton, Ohio.
HIGH TEMPERATURE THERMOELECTRIC RESEARCH.
Quarterly progress rept. no. 5, 1 Jan - 29 Mar 63,
by C. M. Henderson. 29 Mar 63, 42p. incl. illus. tables.
(Contract AF 33(657)7387, Proj. 8173)
Unclassified report

DESCRIPTORS: *Generators, *Thermoelectricity, Electric power production, Electric potential, Thermocouples, Refractory materials, Refractory coatings, Molybdenum, Graphite, Reliability, Design, Model tests, Temperature, Spacecraft.

An experimental model 5-watt (nominal) generator completed 2556 hrs of a sustained performance test at a hot-end temperature of 1200 C (+25 C-4 C), cold end at 714 C (+12 C-0 C), in a vacuum of 1/100000-10 to the minus 6th power. mm Hg without degradation in power producing characteristics. The power/weight ratio of this generator, exclusive of heat source, ranged from 2.70 to 2.86 watt/lb. Tests at 1300 C and higher temperatures will be attempted with this generator. Graphite-ended segmented modules of n- and p-type thermoelectric materials to supplement p-type MCC 50, the thermoelectric material used in the 5-watt generator, were fabricated and partially evaluated. The first such p-n couple produced 250% more power than the p-type MCC-molybdenum couple used in the 5-watt generator. Improved emissive coatings and lightweight junctions between modules were produced. These developments suggest that an advanced experimental 50-watt generator having a power/weight ratio of 10-20 watt/lb is feasible. (Author)

AD-402 075 Div. 7, 8
(TISTE/CAM) OTS price $6.60

General Electric Co., Holyoke, Mass.
HIGH POWER, HIGH VOLTAGE, AUDIO FREQUENCY TRANSFORMER DESIGN MANUAL.
Quarterly rept. no. 2, 1 Oct-31 Dec 62.
1 Jan 63, 1v. incl. illus. tables, refs.
(Contract NObsr-87721, Proj. SR-008-08-02)
Unclassified report

DESCRIPTORS: *Transformers, Design, Extremely low frequency, Very low frequency, Power, Mechanical properties, Electrical properties, Magnetic properties, Electric potential, Capacitance, Inductance, Electrodes, Liquid cooled, Coolants, Mathematical analysis, Theory, Audiofrequency.

A discussion is presented on the investigation, presentation, and verification of data and design methods used to design high power, high voltage, audio frequency transformers. Ratings of these transformers fall within the following characteristics: (a) peak power levels from 15 to 350 kilowatts; (b) operating frequencies from 20 to 20,000 cps (c) peak voltage ratings from 4,000 volts to 28,000 volts; and (d) impedance levels of 300 to 3,000 ohms primary and 10 to 1,200 ohms secondary. The scope of this work includes a discussion of the mechanical and packaging aspects of the design, the insulation materials and processing of those materials, and the electrical and magnetic characteristics of audio frequency transformers. (Author)

AD-402 094 Div. 7
(TISTM/EJH) OTS price $2.60

Delco-Remy Div., General Motors Corp., Anderson, Ind.
SILVER-ZINC SECONDARY BATTERY INVESTIGATION.
Quarterly technical progress rept. no. 3, 1 Jan-1 Apr 63,
by J. J. Lander, and J. A. Keralla. 2 Apr 63, 19p. incl. illus.
(Contract AF 33(657)8943, Proj. 8173)
Unclassified report

DESCRIPTORS: *Storage batteries, *Power supplies, *Electrical power production, Silver alloys, Zinc alloys, Palladium, Mercury compounds, Potassium compounds, Oxides, Hydroxides, Spacecraft, Silver, Particle size, Electrical properties, Electrochemistry, Additives, Electric discharges, Electric current, Electrodes, Life expectancy, Materials.

Three sealed 25 a.h. cells constructed with positive plates to which 1% Pd was added by impregnation with a Pd salt completed 1900 cycles of operation at 80 F. Six additional sealed 25 a.h. cells containing positive plates made with 1% Pd supplied by a vendor reached 500 cycles at 80 F. Cycling of both sets of cells is continuing at 25% depth of discharge which is 50% of the monovalent capacity. Current density and KOH concentration studies are completed. Operation of sealed 25 a.h. cells at low current density and 45% KOH yield the best average cycle life at 25% depth of discharge at 80 F. Expander studies on the negative plate are complete, and the results indicate that 2% polyvinyl alcohol extends the cycle life average more consistently at 25% depth of cell capacity at 80 F. Hydrogen evolution studies at 125 F indicate that 4% HgO addition to the negative plate in 30% KOH results in the least amount of gas production in a 30-day period. Sealed 25 a.h. cells containing 2% and 4% HgO additions in the negative plate material in 40% KOH have completed 687 and 500 average cycles respectively during operation at 25% depth of cell capacity at 80 F. (Author)

AD-402 117 Div. 7
(TISTE/OHD) OTS price $7.60

Bendix Corp., Eatontown, N. J.
3200 CPS ELECTRICAL POWER DISTRIBUTTION CHARACTERISTICS.
14 July 61, 1v. incl. illus. tables (Rept. no. 345)
(Contract NOa(s) 60-6121-c)
Unclassified report

DESCRIPTORS: *Electrical equipment, *Power equipment, *Electric power production, Electrical impedance, Inductance, Electrical properties, Airborne, Very low frequency.

The information in this report is intended to show the basic characteristics associated with the distribution of 3200-cps electrical power. There is no intent to analyze a specific application but to provide general information which can be utilized at some future time to assist with system design by suggesting methods of circumventing possible problem areas. The distribution characteristics of 3200-cps electrical power are quite different in many respects than those associated with power of a lower frequency. In most cases these characteristics can be considered as limitations to using a high frequency electrical power. By the same token however, higher frequency power does provide many advantages in other areas of system operation and performance. Therefore, by necessity, each application must be analyzed independently and completely. From this analysis the choice can be made as to which type of electrical power is most advantageous. (Author)

AD-402 124 Div. 7, 8, 25
(TISTE/OHD) OTS price $8.60

Westinghouse Electric Corp., Pittsburgh, Pa.
LONG LIFE CLOSED LOOP MHD RESEARCH AND DEVELOPMENT UNIT.
Interim scientific rept. no. 4, 15 Dec 62-15 Mar 63.
15 Mar 63, 1v. incl. illus. table, 14 refs.
(Contract AF 33(657)8311)
Unclassified report

DESCRIPTORS *Magnetohydrodynamics, *Plasma physics, Cesium, Monitors, Probes (Electromagnetic), Electrical conductance, Electromagnets, Power supplies, Safety, Analysis, Microwave equipment, Cooling, Argon, Tantalum, Electric motors, Generators, Electric currents, Electric power production, Instrumentation.

The major components of the MHD loop were delivered to the assembly area, and the main effort of the group is concentrated on problems of assembly and preliminary testing of the various portions of the equipment. Because of the expected complexity of the actual testing of the loop and the possibility of extensive damage which may result from improper operation, very careful and detailed attention is being paid to the proper installation and functioning of all parts of the experiment. In addition, a safety survey was made and every reasonable precaution is being taken to insure that personnel will not be hurt in case of an accident. This includes the modification of the present building and rearrangement of the existing equipment. (Author)

Division 7 - ELECTRICAL EQUIPMENT

AD-402 340 Div. 7, 25, 4
(TISTM/EJH) OTS price $1.60

Florida U., Engineering and Industrial Experiment Station, Gainesville.
THE CURRENT DENSITY SUPPORTABLE BY MASS TRANSPORT AT SUBMERGED ELECTRODES.
Summary rept. no. 7 on Fuel Cells,
by Henry R. Wengrow. 8 Feb 63, 13p. incl. illus. table, 6 refs.
(Contract DA 49-186-502-ORD-860)
Unclassified report

DESCRIPTORS: *Fuel cells, *Electric power production, *Power supplies, Electrodes, Hydrogen, Oxygen, Transport properties, Thermodynamics, Electric currents, Density, Diffusion, Surfaces, Liquids, Films, Mathematical analysis, Electrochemistry.

A mathematical model is developed for the mass transport of a reacting species through a liquid to an electrode surface. The resistance is considered to be concentrated in a stagnant film. Calculations are made for the case of oxygen in water under various concentrations and temperatures. For a film thickness of 10 to the -3rd power cm, a temperature of 300 K, and a partial pressure of oxygen of 1 atm, current density supportable by mass transport is equal in 1.03 x 10 to the -2nd power amps/sq cm. It is found that current densities are highest for low temperatures and high partial pressures of O2. At constant pressure of O2, the current density exhibits a minimum at approximately 80 C. (Author)

AD-402 437 Div. 7
(TISTE/JBM) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PROBLEM OF DEPENDABILITY OF ELECTRIC MOTORS,
by N. A. Tishchenko. 12 Mar 63, 22p. incl. illus. tables (Trans. no. FTD-TT-63-35 from Elektrichestvo, No. 11, pp. 7-14, 1961)
Unclassified report

DESCRIPTORS: *Electric motors, Statistical data, Statistical analysis, Time, Probability, Alternating currents, Maintenance, Reliability (Electronics).

AD-402 439 Div. 7
(TISTE/JBM) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CHOICE OF SAFETY FACTOR AND COMPUTATION IN DESIGNING ELECTROMAGNETIC MECHANISMS OF A REQUIRED DEPENDABILITY,
by Ya. A. Rips. 18 Mar 63, 14p. incl. illus. 5 refs. (Trans. no. FTD-TT-63-37 from Elektrichestvo, No. 4, pp. 76-81, 1961)
Unclassified report

DESCRIPTORS: *Electric relays, Electrical properties, Electromagnetic fields, Communication equipment, Control systems, Mechanical properties, Mathematical analysis, Electrical equipment, Safety, Reliability (Electronics).

AD-402 441 Div. 7
(TISTE/JWS) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PROBLEM OF RELIABILITY OF ELECTRIC MOTORS,
by N. A. Tishchenko. 18 Mar 63, 11p. (Trans. no. FTD-TT-63-36 from Russian Periodical, Elektrichestvo, No. 12, pp. 16-19, 1961)
Unclassified report

DESCRIPTORS: *Electric motors, Power, Temperature, Electric currents, Electric insulation, Aluminum, Copper, Copper alloys, Electric potential, Alternating current, Costs, Cooling fans, Reliability (Electronics).

8. ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-401 060 Div. 8, 5, 30
(TISTE/JBM) OTS price $11.00

RCA Defense Electronic Products, Camden, N. J.
DEVELOPMENT OF MICROELEMENT TRANSISTORS.
Formal engineering rept. on Micro-Module Program Extension I.
10 Dec 62, 1v. incl. illus. tables.
(Contract DA 36-039-sc-75968)
Unclassified report

DESCRIPTORS: *Radio communication systems, *Computers, *Packaged circuits, *Transistors, *Walkie-talkie, *Modules (Electronic), Ceramic materials, Encapsulation, Manufacturing methods, Processing, Electric properties, Bonding, Shock (Mechanics), Temperature, Life expectancy, Glass seals, Metal seals, Environmental tests, Reliability (Electronics), Vibration, Welding, Acceleration, Microminiaturization (Electronics).

The micro-module program extension I resulted in the repackaging in microelement form of six reliable transistor devices which are used in the AN/PRC-51 Helmet Radio Set and the MicroPac Computer. Millions of component hours of life test data have been accumulated at the plants of Radio Corporation of America and various subcontractors. The comprehensive testing program clearly established that the microelement transistors comply with the high reliability requirements of the Micro-Module Program. Also included is the development of a transistor package compatible with the micro-module. The major accomplishment of the packaging task was the development of the TO-46 transistor header. The source and tooling for ceramic wafers needed for the different transistors were established. These wafers utilized molymanganese and nickel metalization and are suitable for mounting all of the transistor packages used in the micro-module program. (Author)

AD-401 065 Div. 8
(TISTE/OHD) OTS price $3.60

Westinghouse Electric Corp., Baltimore, Md.
PHOTOELECTRIC INFORMATION STORAGE.
Interim rept. no. 2, 1 Sep-30 Nov 62,
by W. G. Reininger, A. S. Jensen, and W. G. Beran. 30 Nov 62, 1v. incl. illus. tables, 8 refs.
(Contract AF 33(657)8715)
Unclassified report

DESCRIPTORS: *Image tubes, *Storage tubes, Camera shutters, Electronic equipment, Electron guns, Electrodes, Electron accelerators, Photographic recording media, Electroforming, Electric fields, Measurement, Electron tubes, Photocathodes, Image intensifiers, Dielectric recording systems, Camera tubes.

Additional experiments with the electronic shutter showed no leakage of photoelectrons. It was found that the surface roughness of the nickel electroformed targets was resolved with the WX-4787 high resolution reading gun. Several cleaning techniques were tried to improve the surface characteristics. A feasibility study was made of electron beam exposure of a photographic emulsion for TVIST recording. The entire experiment was performed with existing TVIST equipment. The recorded resolution was 2100 TV lines per inch, but the limit is proabably much higher. This process can be used in place of or in addition to the kinescope and camera of the slow scan recording unit. A more elaborate study of the noncharging, nondestructive readout was started. It is hoped that this study will result in increased sensitivity. Also, measurements were made to determine return beam modulation as a function of dielectric and target base potentials. (Author)

AD-401 123 Div. 8, 25
(TISTP/GRW) OTS price $2.60

Stanford Research Inst., Menlo Park, Calif.
PENETRATION OF AN ELECTRON BEAM THROUGH A PLASMA. PART I. ELECTROSTATIC INSTABILITIES.
Summary rept.,
by S. V. Yadavalli and H. H. C. Chang. Dec 62, 25p. 25p. 22 refs.
(Contract Nonr 272800)
Unclassified report

DESCRIPTORS: *Electron beams, *Plasma oscillations, Penetration, Charged particles, Partial differential equations, Plasma physics, Electrostatics.

Consider a relativistic beam of charged particles penetrating a stationary, quiescent plasma. The three main types of instability which can disrupt this system are: (1) streaming (or electrostatic) instability in which the kinetic energy of the beam is converted into longitudinal plasma oscillations; (2) sausage instability, which is the azimuthally symmetric pulsations of the beam, phased so that the induced plasma currents exert forces on the beam in such a manner as to feed the pulsation; (3) hose instability in which the beam is rigidly displaced and with the induced plasma currents again contributing to the instability. Only streaming instability is discussed. (Author)

AD-401 182 Div. 8, 5
(TISTE/CAM) OTS price $1.60

Philco Corp., Palo Alto, Calif.
AN INTEGRATED ''ERROR-FREE'' COMMUNICATION SYSTEM,
by John C. Hansen. 31 Dec 62, 17p. incl. illus.
(Technical note no. WDL-TN62-13)
(Contract AF 04(647)829)
Unclassified report

DESCRIPTORS: *Radio communication systems, *Space communication systems, Errors, Detection, Integrated circuits, Ranges, Synchronization (Electronics), Coding, Reliability, Surface-to-space, Space-to-surface, Command and control systems.

For more efficient operation, a system is proposed which combines the functions of command, synchronization, range, and range rate on one two-way radio link. Extreme reliability of information transfer is achieved by employing comma-free words which have been coded for error detection. Consideration is given to an assumed elemental error probability, corresponding to a conservative signal level Pe = 10 to the minus 4th power. The mean time between error for this case is 10 to the 14th power years. The coding is such that synchronization obtains the same high degree of reliability as the information. In addition to the advantages of essentially error-free communication, the system offers relative ease of implementation common to the class of cyclic codes. (Author)

AD-401 184 Div. 8
(TISTP/MC) OTS price $14.00

Ionosphere Research Lab., Pennsylvania State U., University Park.
LOW FREQUENCY SWEEP GROUP HEIGHT AND POLARIZATION RECORDS.
Rept. for 5 Mar-22 Aug 62 on Ionospheric Research,
by J. D. Hardy. 15 Feb 63, 220p. incl. illus. 3 refs. (Scientific rept. no. 179)
(Contract AF 19(604)8012)
(AFCRL 63-256) Unclassified report

DESCRIPTORS: *Electron density, *Low frequency, Instrumentation, Ionosphere, Polarization.

Sweep records on a low frequency group height and polarization instrumentation covering the swept frequency range of 100 - 1000 kc are presented. Its purpose is determination of the structure of the lower ionosphere. Included in these data are the preliminary results of a stepped frequency experiment. These appear to be the only such records being obtained in the world at this time. In view of this, it was deemed advisable to make them available to the scientific community by this process. (Author)

AD-401 211 Div. 8
(TISTE/CAM) OTS price $11.00

General Electric Co., Pittsfield, Mass.
DESIGN STUDY OF A TRANSPORTABLE ANTENNA SYSTEM.
Quarterly rept. no. 2, 1 Sep-30 Nov 62,
by P. A. Blasangame, W. H. Rote, and C. C. Wales. 30 Nov 62, 154p. incl. illus. tables, 48 refs.
(Contract DA-36-039-sc-90713)
Unclassified report

DESCRIPTORS: *Parabolic antennas, *Radar antennas, *Radar tracking, Satellites (Artificial), Radar equipment, Antenna configurations, Radar pulses, Errors, Analysis, Coding, Radomes, Site selection, Cargo vehicles, Surface properties, Reflection, Hydraulic servomechanisms, Mobile, Automatic.

This report presents the optimization phase of a study to evaluate the feasibility of requirements for a transportable antenna system having an accuracy of 0.05 milliradian CEP and an erection time of 12 hours. The objective of the study has been crystallized into generation of a design manual for transportable satellite trackers. Basic parameters are developed for four basic antenna designs to meet original cost, accuracy and erection time limit requirements. Special studies are expanded to provide a basic format for the final report. (Author)

AD-401 214 Div. 8
(TISTE/JBM) OTS price $1.60

General Electric Co., Owensboro, Ky.
RESEARCH, DEVELOPMENT, AND FABRICATION OF TUNNEL EMISSION CATHODES.
Quarterly interim technical rept. no. 1, July-Sep 62,
by C. E. Horton and J. W. Hall, II. Sep 62, 19p. incl. illus. 7 refs.
(Contract DA49-186-502-ORD-1053)
Unclassified report

DESCRIPTORS: *Cathodes, *Metal films, Aluminum, Oxides, Quantum mechanics, Cathodes (Electron tubes), Electric currents, Electric insulation, Theory, Electrical conduction, Density, Gold, Configuration, Evaporation, Electron accelerators, Field emission, Vacuum apparatus, Gases, Reliability (Electronics), Processing, Films.

The objectives are to develop a better theoretical understanding of the tunnel cathode, to evaluate both materials and processes for the fabrication of this type of device, and thereby to develop a tunnel cathode having desirable electrical and mechanical characteristics. The work done during this period was directed largely toward improving the quality of the anodized aluminum oxide film through which electron tunneling occurs. Because the properties of this film appear to be very sensitive to the conditions under which the alumium emitter film is prepared, considerable effort has gone into improving the vacuum level and cleanliness during the vacuum deposition of this film. A large improvement in the insulating film current density was made as a result of processing changes. (Author)

AD-401 225 Div. 8, 9
(TISTP/JW) OTS price $2.60

Aerospace Corp., Los Angeles, Calif.
HEAT TRANSFER IN POWER TRANSISTORS,
by W. R. Wilcox. 15 Feb 63, 23p. incl. illus.
(Rept. no. TDR-169(3240-10)TR-3)
(Contract AF 04(695)169)
(SSD-TDR-63-39) Unclassified report

DESCRIPTORS: *Heat transfer, Temperature, Distribution, Heat exchangers, Differential equations, Transistors.

The internal heat transfer problem for a typical power-transistor structure has been solved analytically. The relations among current distribution, heat generation, and temperature distribution have been derived. Usage of the resulting equations is illustrated by application to the most elementary problem, namely, uniform heat generation under the emitter. (Author)

AD-401 237 Div. 8
(TISTE/OHD) OTS price $2.60

General Dynamics/Fort Worth, Tex.
MEASURED BARRIER INTERFERENCE ON MONOPULSE ANTENNA,
by J. W. Landers. 14 Mar 63, 25p. incl. illus. tables (Rept. no. FZE-149)
Unclassified report

DESCRIPTORS: *Antennas, *Antenna radiation patterns, Measurement, Test methods, Antenna lobes, K band, Distortion.

AD-401 307 Div. 8
(TISTE/CAM) OTS price $3.60

ITT Industrial Labs., Fort Wayne, Ind.
RESEARCH AND DEVELOPMENT TO IMPROVE THE RESOLUTION OF IATRON DIRECT VIEW STORAGE TUBES.
Interim development rept., 22 Nov 62-22 Feb 63,
by R. H. Clayton and K. R. Crowe. 5 Apr 63, 1v. incl. (Rept. no. SR 00803)
(Contract NObsr-87264)
Unclassified report

DESCRIPTORS: *Storage tubes, Brightness, Focusing, Calibration, Phosphorescent material, Electrodes, Electric potential, Electron lenses, Magnetic properties, Model tests, Electron optics.

Three general approaches were pursued during this period: (1) electron-optical bench; (2) all magnetic Iatron; and (3) magnetic microlens. Electron optical bench work was concluded with positive results. It indicates that resolution improvement can be obtained by the addition of a focus electrode in registry with, and on the

phosphor side of, the backer electrode. Information on the brightness obtainable in such a tube will be available only when mesh fabrication technology is achieved for the inclusion of such a mesh in an operating Iatron. The prototype all-magnetic Iatron demonstrated resolution well in excess of the objectives. (Author)

AD-401 318 Div. 8, 2
(TISTE/CAM) OTS price $1.10

Aerospace Information Div., Washington, D. C.
ON THE QUESTION OF RATIONAL DISTRIBUTION OF GLAZE RIGS IN THE USSR (K voprosu ratsional'nogo razmeshcheniya gololednykh stankov na territorii SSSR),
by A. V. Rudneva. 19 Mar 63, 10p. incl. illus. tables, 4 refs. (AID Rept. T-63-37; Trans. from Leningrad. Glavnaya geofizicheskaya observatoriya. Voprosy klimatografii (Problems in climatography). Leningrad, Gidrometeoizdat, pp. 68-74, 1961)
Unclassified report

DESCRIPTORS: *Transmission lines, Meteorology, Snow, Wind, Rainfall, Terrain, Ice.

AD-401 323 Div. 8
(TISTE/CAM) OTS price $1.10

Philco Corp., Palo Alto, Calif.
MONTHLY RELIABILITY, FAILURE, AND PROBLEM SUMMARIES, LETTER REPORT FOR DECEMBER 1962.
Letter rept.
1962, 1v. incl. tables (Rept. no. WDL-TR2001)
(Contract AF 04(647)532, AF 04(647)829, and AF 04(695)113)
Unclassified report

DESCRIPTORS: *Reliability, *Failure (Mechanics), Parametric amplifiers, Antennas, Power supplies, Electronic relays, Diodes, Electronic equipment.

AD-401 362 Div. 8, 2
(TISTP/JW) OTS price $1.60

Chicago Midway Labs., U. of Chicago, Ill.
RESEARCH ON ATMOSPHERIC ATTENUATION OF INFRARED RADIATION.
Progress rept. no. 1,
by Lucien M. Biberman. 30 June 59, 18p. incl. illus. tables (Rept. no. CML-L-E173-1)
(Contract AF 19(604)5877)
Unclassified report

DESCRIPTORS: *Infrared radiation, *Attenuation, Meteorology, Absorption, Scattering, Measurement, Instrumentation, Wave transmission, Atmosphere.

The objectives of this contract are centered about infrared transmission and include: (1) an investigation of the slant path attenuation between sea level and the tropopause; (2) calculation of attenuation coefficients to correct particular IRMP data; (3) correlation of attenuation data with meteorological conditions; (4) possible separation of absorption and scattering mechanisms; and (4) comparison of scatter data to theory. In order to carry out the program measurement phase, it is planned to use a number of blackbody sources carried aloft by means of balloons. It is necessary to know: (1) the radiance or radiant intensity of the source as a function of time; (2) the absolute value of irradiance and its distribution at the ground-based measuring instrument as a function of time; (3) the position of the balloon relative to the ground station as a function of time; and (4) the meteorological conditions at the balloon location as a function of time. The work during the past month was concerned with the following problems: (1) choice of ground-based measuring equipment; (2) choice of operating procedures to insure tracking of the source sufficiently well to eliminate errors caused by only partial inclusion of source image within the spectrometer slit; (3) studies of methods to monitor source radiance with expendable balloon-borne equipment; (4) error analysis to determine allowable magnitudes of measurement errors; and (5) collection and organization of recording equipment to produce suitable data for subsequent analysis. (Author)

AD-401 395 Div. 8, 26
(TISTM/PCR) OTS price $6.60

Westinghouse Electric Corp., Pittsburgh, Pa.
MATERIAL PROCESSING AND PHENOMENA INVESTIGATIONS FOR FUNCTIONAL ELECTRONIC BLOCKS.
Second interim engineering rept., 1 Jan-6 Mar 63,
by S. J. Angello. 6 Mar 63, 61p. incl. illus. tables.
(Contract AF 33(657)9897)
Unclassified report

DESCRIPTORS: *Materials, *Miniature electronic equipment, *Electrochemistry, *Electron beams, *Lasers, Geometry, Control, Anodes, Oxides, Silicon, Electrolytes, Crystals, Films, Phosphorus, Electron microscopy, Gold, Aluminum, Diodes, Neodymium, Glass, Thickness, Tensile properties, Transistors, Processing, Manufacturing methods, Bonding.

Contents:
Electrochemical Techniques
- Geometry Control and Anodic Oxide Growth on N-type silicon
- Measurements of Surface Recombination Velocity as a Function of Impurities Incorporated into Anodic Oxide Films
- Preparation of High Resistivity N-type Layers by Diffusion of Phosphorus from Very Thin or Very Weakly Doped Anodic Oxide Films
- Measurement of Out-Diffusion of Phosphorus from Doped Anodic Oxide Films

Electron Beam Techniques
- Scanning Electron Microscopy
- Electron Beam Fabricating Techniques
- Electron Beam Exposure of Resist Films

Laser Techniques
- Laser Bonding Gold Leads to Aluminum Coated Silicon
- Laser Bonding Gold Leads to Alloy Junction Diodes
- Laser Equipment-Neodymium Doped Glass Laser Rods

AD-401 39[illegible] Div. 8, 26
(TISTE/CAM) OTS price $8.10

Intellux Inc., Santa Barbara, Calif.
PRODUCTION ENGINEERING MEASURE FOR PRECISION HIGH STABILITY RESISTORS.
Final engineering rept.,
by Nathan Pritikin. 10 Oct 62, 33p. illus.
(Contracts DA 36-039-sc-72722, and DA 36-039-sc-72723)
Unclassified report

DESCRIPTORS: *Glass resistors, *Manufacturing methods, Heat resistant glass, Sprays, Electrostatics, Sealing compounds, Polarization, Humidity, Temperature, Furnaces, Epoxy plastics, Coatings, Photoengraving, Resistors.

AD-401 416 Div. 8
(TISTE/CRJ) OTS price $1.10

Naval Ordnance Lab., Corona, Calif.
N-LOOP VLF SUPERDIRECTIVE ARRAYS,

by E. W. Seeley. 1 Apr 63, 12p. incl. illus. 10 refs. (NOLC rept. 580)
Unclassified report

DESCRIPTORS: *Loop antennas, *Antenna radiation patterns, Mathematical analysis, Beams (Electromagnetic), Phase distortion, Errors, Very low frequency.

Superdirectivity may be achieved with short VLF loop arrays because the beam width depends only upon the number of loops and not upon the length of the array. In addition, the usual factors limiting superdirectivity are not as prevalent in these arrays because of the decoupling between VLF loops. Expressions are derived for the beam width, effective height, reception pattern, amplitude and position of the back lobes, and the effects of voltage phase and amplitude differences between loops. These equations describe short arrays of any number of loops. The most serious limitation concerning the directivity of superdirective loop arrays is caused by the voltage phase and amplitude differences between loops. These differences between adjacent loops combine to obscure the nulls and deteriorate the reception pattern. (Author)

AD-401 448 Div. 8, 26
(TISTE/JBM) OTS price $4.60

Pacific Semiconductors Inc., Lawndale, Calif.
PRODUCTION ENGINEERING MEASURE (TRANSISTOR, VHF, SILICON, POWER (75W).
Quarterly rept. no. 2, 1 Oct-31 Dec 62, by R. N. Clarke, R. C. Neville, and J. W. Ewins. 31 Dec 62, 1v. incl. illus. tables (PSI rept. no. 3000:47-Q-2)
(Contract DA 36-039-sc-86733)
Unclassified report

DESCRIPTORS: *Transistors, *Production, Very high frequency, Power, Processing, Environmental tests, Mechanical properties, Beryllium, Oxides, Packaged circuits, Electric insulation, Failure (Mechanics), Diffusion, Impurities, Epitaxial, growth, Molybdenum, Life expectancy, Shock (Mechanics), Torque, Vibration, Electrical properties, Transistor amplifiers, Oscillators, Silicon.

Efforts continued on the development of a production engineering measure for a very high frequency silicon power transistor. Process improvements, package design and new contacts were the major areas of activity. Additional work on test circuitry and beginning material preparation were initiated. The beryllium oxide tab was under intensive investigation and considerable knowledge has been gained. Environmental and mechanical testing of the package was initiated to guide in further packaging changes. (Author)

AD-401 533 Div. 8
(TISTE/JWS) OTS price $12.00

Texas Instruments Inc., Dallas.
RESEARCH AND DEVELOPMENT OF HIGH TEMPERATURE SEMICONDUCTOR DEVICES.
Final summary rept., 1 Mar 59-31 July 62, by E. C. Wurst. Mar 63, 1v. incl. illus. tables, refs.
(Contracts NObsr-77532 and NObsr-85424)
Unclassified report

DESCRIPTORS: *Semiconductor devices, Tin, Life expectancy, Electrodes, Vapor plating, Diffusion, Gallium alloys, Arsenic alloys, Cadmium, Manganese, Sulfur, Electric potential, Gold, Resistance (Electrical), Single crystals, Mercury, Zinc, Coatings, Silicon, Chemical milling, Transistors, Tunnel diodes, Reliability, Switching circuits, High temperature research.

Alloy contact studies for both ohmic and rectifying contacts, diffusion studies of primarily acceptors, and etching studies were carried out. No satisfactory high temperature and high injection efficiency emitter alloy was found. Primarily both tin and gold-tin make good high injection efficiency emitter junctions, but neither allow operation of the devices up to the 400 C. However, other program requirements were met and messurements of feasibility units made. h(fe), vs frequency measurements atV(CB)of 3 Volts and I(E)of 5 ma yielded gain bandwidths products, f(T), as great as 800 Mc. h-parameter measurements of f of 1000 cps,V(CB),of 5 volts andI(E)of 1 ma yielded common emitter power gains, G, ranging from 30-43.6 db. The switching characteristics of a number of these units were also investigated. In the saturated mode, with no speed-up capacitor, some GaAs transistors yielded total switching times, t total, from 10-30 nanoseconds. Several units with gold-tin alloyed emitters were heated to 350 C with very careful handling. The betas of these transistors changed negligibly over the temperature range of 25-350 C. Frequency vs temperature over this range could be decreased by two.

AD-401 544 Div. 8
(TISTP/WH) OTS price $3.60

Mathematics Research Center, U. of Wisconsin, Madison.
A NUMERICAL INVESTIGATION OF SCATTERING OF RADIATION OF AN ASYMMETRIC SOURCE BY CIRCULAR CYLINDER, by N. Zitron and J. Davis. Mar 63, 33p. incl. illus. tables, 16 refs. (MRC technical rept. no. 365)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Radio waves, *Cylindrical bodies, *Scattering, Integral equations, Numerical analysis, Propagation.

An asymptotic expansion obtained previously is employed to explore the limits of validity of plane wave and line source assumptions for the incident wave, in the problem of scattering of waves by an infinite cylinder. Detailed numerical calculations are made in the cases where the incident wave is a plane wave, line source radiation, and slotted cylinder radiation. Curves are presented showing the variation of the amplitude of the scattered wave with respect to spacing of the source and scatterer. The effect of the directivity of a source is discussed. (Author)

AD-401 595 Div. 8, 5
(TISTP/WH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
NONLINEAR APERTURE CORRECTION,
by G. V. Braude and I. N. Isayeva. 12 Feb 63, 15p. incl. illus. 6 refs. (Trans. no. FTD-TT-62-1726 from Russian Periodical, Tekhnika Kino i Televideniya, no. 12, pp. 3-10, 1961)
Unclassified report

DESCRIPTORS: *Video signals, *Video amplifiers, *Television display systems, *Circuits.

AD-401 665 Div. 8
(TISTE/AW) OTS price $3.60

Fairchild Semiconductor Div., Fairchild Camera and Instrument Corp., Mountain View, Calif.
PRODUCTION ENGINEERING MEASURE 2N914 AND 2N995.

Quarterly rept. no. 3, 31 Oct 62-30 Jan 63, by D. M. Kobrin. 30 Jan 63, 1v. incl. illus. tables.
(Contract DA 36-039-sc-86726)
Unclassified report

DESCRIPTORS: *Transistors, Bonding, Gold, Wire, Failure (Mechanics), Aluminum, Metals, Silver, Palladium, Diodes (Semiconductor), Reliability, Silicon, Ultrasonic radiation, Platinum alloys, Temperature, Electrical properties, Oxidation, Carbides, Tungsten compounds, Epitaxial growth, Manufacturing methods.

Production techniques to increase the reliability of 2N914 and 2N995 transistors are presented. Processes being improved include lead attach, preparation of substrate for epitaxial growth, header plating, particle elimination, and die attach. (Author)

AD-401 672 Div. 8
(TISTE/CRJ) OTS price $10.50

General Mills, Inc., Minneapolis, Minn.
COMMUNICATION VIA ARTIFICIAL SCATTERERS PHASE II, by W. Grosz, L. Flink and others. 15 Dec 62, 1v. incl. illus. tables, 12 refs. (Rept. no. 2353)
(Contract Nonr-158924)
Unclassified report

DESCRIPTORS: *Communication systems, *Signals, Diffraction grating, Dipole antennas, Propagation, Radio signals, Electromagnetic waves, Transponders, Design, Scattering.

The feasibility of establishing an effective scatter propagation communication path below the ionosphere has been further examined. This communication path would be free from interruption due to ionospheric storms. The investigations covered in this report are limited to a frequency range of 1 mc/s to 20 gc/s and an altitude of the artificial scatterers which is below the ionosphere. Three major approaches to the general communication problem were studied in Phase II: (1) scattering by coherent grating arrays deployed in the atmosphere; (2) active repeaters placed on the ocean surface; and (3) scattering by a cloud of randomly oriented artificial scatterers in the atmosphere. (Author)

AD-401 674 Div. 8
(TISTE/OHD) OTS price $3.60

Ionosphere Research Lab., Pennsylvania State U., University Park.
AN IMPROVED LOW FREQUENCY SWEEP POLARIMETER. Rept. on Ionospheric Research, by S. Weisbrod and A. J. Ferraro. 1 Apr 63, 30p. incl. illus. 3 refs. (Scientific rept. no. 182)
(Contract AF 19(604)8012)
(AFCRL 63-290) Unclassified report

DESCRIPTORS: *Test equipment (Electronics), *Measuring devices, Extremely low frequency, Medium frequency, Ionospheric propagation, Communication theory, Radio equipment, Radio receivers, Radiofrequency amplifiers, Mixers (Electronic), Video amplifiers, Power supplies, Polarization.

This research describes an improved version of a low frequency polarimeter which is used in conjunction with the low frequency sweep studies at the Ionosphere Research Laboratory. The purpose of this equipment is to resolve signals received from horizontal cross-polarized dipoles into signals which are proportional to the sum and difference of the ordinary and the extraordinary magneto-ionic components over the frequency range of 80 to 1200 kc. In the construction of this equipment emphasis has been placed on sensitivity, stability, elimination of spurious coupling between channels, and the ease of routine calibration and adjustment. (Author)

AD-401 680 Div. 8, 14, 25, 26
(TISTM/EJH) OTS price $4.60

Servomechanisms, Inc., Goleta, Calif.
ARMY/NAVY INSTRUMENTATION PROGRAM. PHOSPHOR RESEARCH.
Final rept.,
by E. J. Soxman. Dec 62, 49p. incl. illus. table, refs. (Rept. no. SMIR 62-7)
(Contract Nonr-107600; Subcontract to Douglas Aircraft Co., Long Beach, Calif.)
Unclassified report

DESCRIPTORS: *Electroluminescence, *Phosphorescent materials, *Dielectric films, *Semiconductors, Display systems, Films, Electrodes, Zinc compounds, Sulfides, Germanium compounds, Dioxides, Aluminum, Tin compounds, Manufacturing methods, Manganese, Catalysts, Crystal structure, Dielectric properties, Electrical properties, Crystals, Semiconductor devices, Photoelectric effect, Thin films (Storage devices), Vapor plating.

A program was carried out involving a study of thin-film electroluminescent cells produced on glass substrates. Transparent SnO_2 was used for one electrode and aluminum for the other electrode. A one-step, reproducible procedure was established for preparing ZnS:Mn phosphor films. This procedure does not require excessively high temperatures or succeeding heat treatment. It was possible to fabricate numerous arrays of small cells, each approximately 0.025 in. x 0.025 in. square. A strong correlation was found between efficient electroluminescence and the development of a well-crystallized, highly oriented film structure consisting of the cubic form of ZnS. The rate of change of light output of these cells per incremental change in applied voltage was observed to be significantly greater than that for a common commercial electroluminescent cell. Exceptionally high dielectric strength (2500 volts/mil) and effective dielectric constant (50 to 70) were exhibited by cells which included an additional dielectric film of GeO_2. A side discovery was the unique hollow crystals of hexagonal ZnS.

AD-401 737 Div. 8
(TISTE/CAM) OTS price $4.60

Antenna Systems Lab., U. of New Hampshire, Durham.
THE COAXIAL DIPOLE PARAMETRIC AMPLIFIER ANTENNA, by Albert D. Frost. 1 Dec 62, 36p. incl. illus. (Scientific rept. no. 1)
(Contract AF 19(628)307)
(AFCRL 63-13) Unclassified report

DESCRIPTORS: *Parametric amplifiers, *Dipole antennas, Theory, Mathematical analysis, Electric impedance, Tuned circuits, Coupling circuits, Surface properties, Antenna configuration, Coaxial line, Slot antennas, Design, Very high frequency.

A study was made of the theoretical and applied problems associated with the design of a parametric amplifier antenna in coaxial dipole form. An analysis was made of the coaxial interior, which serves to provide the resonances needed for parametric amplification, and an expression was derived for the complex impedance seen by the varactor diode in terms of the inner co-axial

geometry, the relative electrical length of the output loop, the receiver input resistance and an adjustable terminating reactance. This latter element permits the tuning of the system for a desired pair of signal and idler frequencies. A completed tuning and bias system for a quarter-wave dipole at 108 mc. is shown. (Author)

AD-401 766 Div. 8, 26
(TISTE/OHD) OTS price $2.60

Radio Corp. of America, Harrison, N. J.
PRODUCTION ENGINEERING MEASURE FOR TUBE TYPE 7587.
Quarterly rept. no. 3, 1 Dec 62-28 Feb 63,
by W. Ackermann. 28 Feb 63, 25p. incl. illus.
(Contract DA 36-039-sc-86732)
Unclassified report

DESCRIPTORS: *Electron tubes, *Manufacturing methods, Production, Machines, Brazing, Electric wire, Triodes.

The report indicates the practical design philosophies employed in each equipment and the results of initial machine tests, where applicable. Also included are photographs of completed machine assemblies, both to indicate the specific design features and the degree of construction. This account shows that the design phase of all tasks is complete and construction is advancing rapidly. (Author)

AD-401 820 Div. 8
(TISTE/JWS) OTS price $1.60

Chrysler Corp., Center Line, Mich.
SIMPLIFIED TRANSISTOR DESIGN PROCEDURES.
Rept. on Electromagnetic Radition,
by C. J. Christman. 8 Apr 63, 13p. incl. illus.
22 refs. (Technical note ADB-TN-21-63)
Unclassified report

DESCRIPTORS: *Transistors, Transistor amplifiers, Harmonic oscillators, Electrical impedance, Electric potential, Power, Mathematical prediction, Circuits.

Transistor design procedures, found useful in advanced development electromagnetic radiation effects, are presented here. This compilation of procedures was selected to make use of the methods employing hybrid parameters and those generally eliminating rigor associated with the more formal methods of analysis. These procedures include bias circuit design, input impedance calculations for the common emitter, voltage gain calculations for the common emitter, input-output impedance of the emitter-follower stage, and power output of class A and B amplifiers. Consideration is given to tuned harmonic multiplier efficiency. (Author)

AD-401 857 Div. 8
(TISTP/FEM) OTS price $2.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
MICROWAVE PROBING OF ELECTRON DECAY IN A GAS DISCHARGE,
by Marland C. Gale. 18 Jan 63, 16p. incl. illus.
(Scientific rept. no. PIBMRI-977-61)
(Contract AF 19(604)7216, Proj. 4619)
(AFCRL 63-17) Unclassified report

DESCRIPTORS: *Gas discharges, *Microwaves, Glow discharges, Electron density, Plasma sheath, Hydrogen, Cathodes, Metals, Impurities, Attenuation, Wave transmission, Phase measurement, Experimental data, Discharge tubes, Probes (Electromagnetic).

A method is described for determining the electron density and collision frequency in the afterglow of a pulsed discharge in hydrogen. The results indicate that the electron density does not decay exponentially, but that it decays more rapidly at first and less rapidly later. It is shown that this is probably due to the existence of a net negative charge in the center of the discharge tube, arising from sputtering of the cathode metal onto the walls of the tube, or to the presence of impurity atoms. (Author)

AD-401 861 Div. 8, 25
(TISTE/CRJ) OTS price $2.60

Technical Research Group, Syosset, N. Y.
MILLIMETER-WAVE AMPLIFICATION BY RESONANCE SATURATION,
by Benjamin Senitzky, Gordon Gould, and Sylven Cutler. 13 Feb 63, 24p. incl. illus. (Technical note no. 2)
(Contract AF 30(602)2744, Proj. 175)
(RADC-TDR-63-84) Unclassified report

DESCRIPTORS: *Microwave amplifiers, *Cavity resonators, Inorganic acids, Cyano, Waveguides, Resonance absorption, Nonlinear systems, Sidebands, Power, Amplitude modulation, Attenuation, Frequency modulation, Electromagnetic fields, Microwave equipment, Operation, Quantum mechanics, Theory.

The non-linear properties of a power-saturated resonant medium are used to obtain amplification of millimeter-wave radiation. Experiments demonstrating this effect are performed with the 3.5 mm rotational resonance of hydrogen cyanide (HC-12 N-15) gas. An incoming radiation spectrum consisting of a strong saturating component at 3.5 mm and weak sidebands is transmitted through a gas-filled, 3/4-inch-diameter, 20-ft. circular waveguide operated in the TE01 mode. Under certain conditions power can be transferred from the strong saturating component to the weak sidebands. A sideband gain with a maximum value of 1.5 db is measured when the sidebands are phased for amplitude modulation and the saturating component input power is 4.8 mw. The bandwidth for this type of amplification is equal to the power-broadened linewidth. Sidebands phased for frequency modulation are always attenuated. The experimental results are in agreement with computations based on the solution of the quantum mechanical Boltzmann equation. These computations indicate that a single sideband can also be amplified. (Author)

AD-401 862 Div. 8
(TISTE/CRJ) OTS price $5.00

Office of Naval Research, Washington, D. C.
SECOND CONFERENCE ON THE NAVY MICROELECTRONICS PROGRAM, WASHINGTON, D. C., SEPTEMBER 24, 25, 26, 1962.
1962, 364p. incl. illus. tables, refs. (Rept. no. ONR-14)
Unclassified report

DESCRIPTORS: *Microminiaturization (Electronics), *Symposia, Thin films (Storage devices), Semiconductor devices, Semiconducting films, Antisubmarine warfare, Shipborne, Circuits, Electronic equipment, Digital computers, Fire control computers, Airborne, Frequency modulation, Phase shifters, Integrated circuits, Reliability (Electronics), Molecular electronics, Servo amplifiers, Radiation damage, Guided missiles, Encapsulation.

AD-401 870 Div. 8
(TISTE/JBM) OTS price $1.00

Sylvania Electric Products, Inc., Waltham, Mass.
ACTIVE THIN-FILM TECHNIQUES MICROMIN PROGRAM.
Interim development rept. no. 3, 23 Dec 62-22 Mar 63,
by Egons Rasmanis and James Cline. 14 Apr 63, 1v. incl. illus. tables, 6 refs. (Rept. no. 0445-3)
(Contract NObsr-87633, Proj. SR008-03-03)
Unclassified report

DESCRIPTORS: *Semiconducting films, *Transistors, *Diodes (Semiconductor), *Microminiaturization (Electronics), Silicon, Germanium, Resistance (Electrical), Vapor plating, Vacuum apparatus, Hall effect, Electron diffraction analysis, Integrated circuits, Electrical properties, Optical analysis, Antimony, Impurities, Boron, Aluminum, Heaters, Chemical milling, Electric potential, Processing.

Research continued on the development of a process for depositing device-quality silicon and/or germanium films on polycrystalline insulating substrates by vacuum evaporation of silicon and/or germanium and to form diodes and transistors in these films. A total of 112 silicon vacuum depositions were made; both p- and n-type silicon films of various resistivities were deposited. A method of controlled doping of silicon films during vacuum deposition was developed. Diode characteristics with reverse breakdown up to 20 volts were obtained on vacuum-deposited silicon pn junctions. A mechanical mask changer was designed, built and installed in the ultra-high vacuum system. Optical studies, electron diffraction studies, and Hall Effect measurements have been carried out on the vacuum deposited films. (Author)

AD-401 891 Div. 8
(TISTE/JWS) OTS price $2.60

Cruft Lab., Harvard U., Cambridge, Mass.
A STUDY OF THE SLOT TRANSMISSION-LINE AND SLOT ANTENNA. PART I: SOME INVESTIGATION OF THE SLOT TRANSMISSION-LINE,
by Robert W. Burton. 10 Jan 63, 1v. incl. illus. 4 refs. (Technical rept. no. 397)
(Contract Nonr-186632, Proj. NR-371-016)
Unclassified report

DESCRIPTORS: *Waveguide slots, *Transmission lines, Resonators, Measurement, Mathematical prediction, Electromagnetic fields, Electric currents, Electromagnetic properties.

A series of related experiments on the slot transmission-line and their results are described. The three major phases of investigation are: (a) a conducting image plane as a termination for a slot transmission-line, (b) a practical design of a matched load, and (c) the effect of a bend-out-of-the-plane on the transmission characteristics of the slot transmission-line. The results of this experiment to show the effects of bends out-of-the-plane are, on the one hand, somewhat surprising and, on the other, somewhat expected. Babinet's principle offers a method of solving complementary or dual problems but only if the elements are in the plane. Electromagnetic fields resulting from dual sources or elements are synthesized using symmetrical and antisymmetrical fields about a planar surface. (Author)

AD-401 892 Div. 8
(TISTE/JWS) OTS price $1.60

Cruft Lab., Harvard U., Cambridge, Mass.
A STUDY OF THE SLOT TRANSMISSION-LINE AND SLOT ANTENNA. PART 2: A COAXIAL AMPLITUDE-INSENSITIVE PHASE-DETECTION SYSTEM.
Technical rept.,
by Robert W. Burton. 20 Jan 63, 1v. incl. illus. 5 refs. (Technical rept. no. 398)
(Contract Nonr-186632, Proj. NR-371-016)
Unclassified report

DESCRIPTORS: *Phase detectors, Electromagnetic properties, Waveguide couplers, Standing wave ratios, Errors, Phase measurement, Microwave equipment.

A coaxial amplitude-insensitive phase-detection system is discussed in detail. The system employs the hybrid junction in a balanced detector configuration to render a null reading independent of the relative magnitudes of both the reference and the unknown signals. A theoretical formulation, experimental results and evaluation of errors are presented. (Author)

AD-401 900 Div. 8
(TISTE/OHD) OTS price $1.60

Union Carbide Corp., Parma, Ohio.
KRYPTON FILLED THERMIONIC CONVERTER.
Quarterly technical progress rept. no. 1, 1 Jan-31 Mar 63,
by R. Forman. Apr 63, 17p. incl. illus. 4 refs.
(Contract AF 33(657)10132)
Unclassified report

DESCRIPTORS: *Diodes (Electron tubes), *Thermionic converters, Argon, Krypton, Gamma rays, Radiation damage, Radiofrequency generators, Medium frequency, Helium group gases, Negative resistance circuits.

Research work on irradiated inert gas thermionic diodes is presented. Tubes containing argon and krypton at various pressures in the range of about 100 torr were tested in the unirradiated condition and under high radiation conditions, including Co60 gamma irradiation and the radiation from the core of a 5-megawatt swimming-pool reactor. The results of these measurements are described and evaluated. Measurements on inert, gas-filled irradiated diodes with negative resistance characteristics are also discussed showing how such diodes can be used as a.c. generators over a range of frequencies up to 10 megacycles. (Author)

AD-401 910 Div. 8
(TISTE/OHD) OTS price $2.60

Army Electronics Research and Development Activity, White Sands Missile Range, N. Mex.
COMPRESSION AMPLIFIER,
by Claude A. Steffey. Oct 62, 22p. incl. illus. 4 refs. (Technical rept. no. SELWS-E-108)
(Proj. NR 3C16-19-001)
Unclassified report

DESCRIPTORS: *Transistor amplifiers, *Amplifiers, Design, Feedback amplifiers, Analysis, Stabilization, Automatic gain control, Servoamplifiers.

This report discusses the design and construction of a transistorized, amplitude-compression amplifier and gives one application of this circuitry in the form of a multichannel distribution amplifier. The automatic gain control circuit is capable of maintaining a constant output

level over a wide range of input levels, providing a high degree of stability despite component, voltage or temperature variations. By incorporating the variable impedance properties of diodes, or diode-connected transistors, as one element of a variable L pad, and controlling this impedance by a servo-type, closed-loop feedback network, the system is apparently immune to both parameter variations and power supply fluctuations. (Author)

AD-401 912 Div. 8
(TISTP/RD) OTS price $8.60

General Electric Co., Syracuse, N. Y.
RADC TRINIDAD TEST SITE. VOLUME V. A STUDY OF THE IONOSPHERE UTILIZING THE INCOHERENT SCATTER TECHNIQUE.
Final rept. on Phase 1.
30 June 61, 86p. incl. illus.
(Contract AF 30(602)2244)
(RADC TDR 61-194, vol. 5) Unclassified report

DESCRIPTORS: *Electromagnetic waves, *Radio waves, *Ionosphere, Magnetic fields, Data processing systems, Magneto-optic effect, Polarization, Terrestrial magnetism, Scattering, Ultrahigh frequency, Ionospheric propagation, Electron density.

The analysis of ionospheric incoherent backscattered echoes displaying Faraday rotational effects are treated. The theoretical concepts of incoherent scattering and its application as a technique for investigating the characteristics of the earth's atmosphere is considered. A discussion is given on the theory of the Faraday effect. The possible utilization of this phenomenon in conjunction with ionospheric incoherent scatter for the study of the earth's magnetic field is also mentioned. The radar, recording, and processing equipment used in the experimental work is briefly described. In addition, a description is given on the characteristics of incoherent backscatter echoes. Experimental measurements show that, for linear polarized transmissions, the incoherent backscattered signals received on two linear orthogonal channels maximize at different radar ranges. It is found that the positions of the signal maxima correlate with those theoretically predicted based on the ionospheric Faraday effect. Evidence is presented which indicates the feasibility of utilizing the Faraday effect to provide the calibration factor for converting the relative electron density profiles deduced from incoherent backscatter into an absolute measurement. (Author)

AD-401 919 Div. 8
(TISTP/FEM) OTS price $1.60

Air Force Cambridge Research Labs., Bedford, Mass.
POSITIONING OF FERRIMAGNETS IN A RESONANT CAVITY TO INDUCE MAGNETOSTATIC MODES OF OSCILLATION,
by H. Roland Zapp. Jan 63, 11p. incl. illus.
7 refs. (Rept. no. AFCRL 63-16)
(Proj. 4608)
Unclassified report

DESCRIPTORS: *Resonators, Microwave oscillators, Oscillation, Magnetic properties, Geometric forms, Transformations (Mathematics), Polynomials, Partial differential equations, Simultaneous equations, Ferromagnetic materials.

Magnetostatic modes of oscillation arise when nonuniform magnetic fields are applied to a ferrimagnetic sample. This can be achieved by positioning a ferrimagnet within a microwave resonating cavity. Position in a cavity that a sample must be placed to obtain particular modes of oscillation is discussed. Correct identification of magnetostatic modes is useful in computing one of the most important properties of magnetic substances--saturation magnetization. Two approaches are taken to the foregoing problem. The first yields a general equation for the location which will produce a desired mode. This equation tends to be mathematically complicated. The second approach places a sample in a symmetrical field position within the resonant cavity, checking to see which modes are present and their relative intensities. The latter method is mathematically simpler and permits practical application. (Author)

AD-401 922 Div. 8, 25
(TISTP/FEM) OTS price $2.60

Microwave Lab., Stanford U., Calif.
MICROWAVE RESEARCH.
Quarterly status rept. no. 16, 1 Nov 62-31 Jan 63.
Mar 63, 25p. incl. illus. (M. L. rept. no. 1016)
(Contract Nonr-22548, Proj. 373-361)
Unclassified report

DESCRIPTORS: *Microwave equipment, *Plasma physics, Frequency multipliers, S-band, Parametric resonance, Refrigeration systems, Electron beams, Nonlinear systems, Parametric amplifiers, Harmonic oscillators, Gas discharges, Lasers, Ruby, Interferometers, Piezoelectric effect, Semiconductors, Acoustics, Crystals, Ferrites, Industrial research.

Contents:
Transverse-wave frequency doublers
Parametric refrigeration
Nonlinear quantum effects
Optical masers
Acoustic wave amplification studies
Ferrite nonlinear propagation
Plasma harmonic generation

AD-401 931 Div. 8, 14
(TISTM/PCR) OTS price $6.60

Energy Conversion and Semiconductor Lab., Mass. Inst. of Tech., Cambridge.
RESEARCH ON MATERIALS, PROCESSES, AND DEVICES RELATED TO ENERGY CONVERSION.
Semiannual technical summary rept. 31 Dec 62, 65p. incl. illus. tables (Rept. no. 6)
(Contract Nonr-184178, Proj. 9800)
Unclassified report

DESCRIPTORS: *Superconductors, *Electrochemistry, *Thermoelectricity, *Thermionic converters, *Thermionic emission, *Energy conversion, Superconductivity, Alloys, Microstructure, Niobium, Thorium, Eutectics, Phase studies, Deformation, Fracture (Mechanics), Semiconductor devices, Semiconductors, Radiation damage, Photoelectric effect, Zinc, Antimony alloys, Molybdenum, Oxides, Materials, Fuel cells.

Research reports are presented on: (1) Superconducting materials and systems, (2) Electrochemical energy conversion research, (3) Thermoelectric and thermionic materials research, (4) Solid state energy converters, and (5) The development of thermionic emitter materials. (Author)

AD-401 933 Div. 8, 14, 25
(TISTM/EJH) OTS price $9.10

General Electric Co., Schenectady, N. Y.
INVESTIGATION OF VARIOUS ACTIVATOR REFRACTORY SUBSTRATE COMBINATION.
Final rept.,

by J. H. Affleck. 5 Mar 63, 1v. incl. illus. tables, refs.
(Contract AF 19(628)279, Proj. 4619)
(AFCRL 63-69) Unclassified report

DESCRIPTORS: *Thermionic emission, *Cathodes (Electron tubes), Diodes (Electron tubes), Cesium, Refractory materials, Catalysts, Surfaces, Tungsten, Nickel, Molybdenum, Molybdenum compounds, Barium compounds, Calcium compounds, Borides, Silicides, Silicates, Aluminates, Oxides, Films.

An investigation was conducted to study thin-film activator-refractory substrate combinations for new materials capable of producing high emission density cathodes. Consideration was given to the nature of the boundary, the surface of the cathode, and vacuum in an externally dispensed system. Although a relation between the relative evaporation rate of electrons and the evaporation rate of the activator may be obtained, experimental confirmation in compliance with the basic assumptions is difficult. An empirical examination of internally dispensed systems was made to show what effect the substrate has on the thermionic properties of a dispenser cathode. A number of systems are reported which combine a barium compound with a refractory material such as tungsten, tantalum, molybdenum, or one of the carbides, borides or silicides of these same elements. It appears that the activator-substrate combination has only a secondary effect on the thermionic properties in the system examined. (Author)

AD-402 063 Div. 8
(TISTE/CAM) OTS price $3.60

Microwave Associates Inc., Burlington, Mass.
LONG LIFE K-BAND DUPLEXER.
Quarterly technical rept. no. 1, 1 July-1 Oct 62, by Robert Tenenholtz. 6 June 61, 1v. incl. illus. (Rept. no. 2)
(Contract DA 36-039-sc-90834)
Unclassified report

DESCRIPTORS: *Radar duplexers, K band, Life expectancy, Superhigh frequency, Configuration, Limiters, Diodes (Semiconductors), Ferrites, Waveguides, Standing wave ratios, Design.

A prototype ferrite circulator was designed, fabricated and tested. In addition, design and preliminary tests were performed on two PN junction limiter configurations. A discussion on the overall duplexer theory of operation is presented along with low-level test data. (Author)

AD-402 067 Div. 8, 5
(TISTE/CAM) OTS price $3.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DATA TRANSMISSION TESTING FROM DONNELLY FLATS, ALASKA, TO SUNNYVALE, CALIFORNIA OVER A NETWORK OF CARRIER EQUIPMENT,
by P. L. Grant. 21 Feb 63, 10p. illus. table.
(Rept. no. 25-G-11)
(Contract AF 19(628)500)
(AFESD TDR 63-26) Unclassified report

DESCRIPTORS: *Data transmission systems, *Transmission lines, Communications equipment, Measurement, Circuits, Digital systems, Errors, Coding, Data processing systems, Test methods, Ranges, Underwater.

The summary is presented of data measurements made from 27 June 1962 to 28 July 1962 evaluating the coded biphase data modem over a combination of K-carrier, TD-2 (microwave), and submarine cable from Donnelly Flats, Alaska, to Sunnyvale, California. (Author)

AD-402 068 Div. 8, 26
(TISTM/EJH) OTS price $9.10

Bendix Semiconductor Div., Bendix Corp., Holmdel, N. J.
PRODUCTION RELIABILITY IMPROVEMENT PROGRAM FOR GERMANIUM TRANSISTOR 2N1430.
Quarterly progress rept. no. 3, 31 Oct 62-31 Jan 63 on Production Engineering Measure, by John Nussear, Henry Sivik, and John Szarranski. 31 Jan 63, 1v. incl. illus. tables.
(Contract DA 36-039-sc-86723)
Unclassified report

DESCRIPTORS: *Transistors, *Manufacturing methods, Reliability (Electronic equipment), Resistance (Electrical), Germanium, Single crystals, Crystal growth, Etched crystals, Alloys, Degasification, Diffusion, Chemical milling, Quality control, Life expectancy, Failure (Mechanics), Specifications, Storage, Tables, Data, Production.

Contents:
Reliability improvement program
Germanium diffused alloy transistor
Resistivity control
Etch pit control
Uniform penetration in diffusion
Depth control in alloying
Spreading and wetting in alloying
Collector attachment
Surface passivation and final preparation prior to sealing
Gettering technique
Leak determination
Appendices I-V

AD-402 069 Div. 8
(TISTE/CAM) OTS price $5.60

SHAPE Air Defense Technical Center, The Hague, Netherlands.
BURIED ANTENNAS,
by H. P. Williams. Feb 63, 51p. incl. illus. 13 refs. (Technical memo. no. TM-58)
Unclassified report

DESCRIPTORS: *Antennas, Antenna configurations, Antenna radiation patterns, Propagation, Effectiveness, Signal-to-noise ratio, Electrical impedance, Electrical conductance, Equations, Analysis, Theory, Soils, Underground structures.

The subject of buried antennas has been brought to a pitch where all the major design parameters can be calculated. The theory is reviewed as it is now known, and simple heuristic demonstrations of the more important field equations are presented. The problem of signal-to-noise ratio is considered and an example given of communication over a distance of 50 km. When used for reception, buried antennas have the advantage that they reduce the noise due to precipitation static. Also they have a directive polar pattern (a figure of eight) which can be useful in some applications. In both these features buried antennas resemble the screened loop receiving antenna. (Author)

AD-402 076 Div. 8, 25
(TISTE/OHD) OTS price $10.10

Physical Electronics Research Lab., Inst. of Tech., U. of Minn., Minneapolis.
STUDY OF ELECTRICAL AND PHYSICAL CHARACTERISTICS

OF SECONDARY EMITTING SURFACES.
Final rept., 16 Jan-15 Oct 62,
by W. T. Peria. Mar 63, 110p. 68 refs.
(Contract AF 33(657)8040, Proj. 4156)
(ASD TDR 63-175) Unclassified report

DESCRIPTORS: *Secondary emission, *Solid state physics, Metallic crystals, Titanium, Tungsten, Gold, Metal films, Dielectric films, Magnesium compounds, Oxides, Interferometers, Ionic current, Tantalum, Sodium compounds, Chlorides, Crystal lattices, Crystal structure, Electron beams, Surface properties.

Slow electron diffraction from the (001) surface of a MgO crystal reveals two different types of surface structure. One is a fc structure with the MgO lattice constant. The other has a double spacing in those azimuths for which the sum of the indices is even. The effects of heating and sputtering on the pattern from the fc structure are described. The effect of these treatments on the secondary electron emission is also described. A qualitative explanation of the ''extra'' intensity maxima in slow electron diffraction patterns is presented. A new model is proposed to explain the major peaks observed in the curves of the variation of secondary emission from single crystals as a function of the angle of incidence of the primary beam. Qualitative explanations of the manner in which the magnitude and width of these peaks vary with primary energy are given in terms of the model. The reason for the differences in the characteristics of the peaks for metals and insulators is also suggested by the model. Using a previous calculation as a starting point, the influence of an internal electric field on the secondary emission from ionic crystals is computed. The results are in fair agreement with experiment for the case of MgO. (Author)

AD-402 085 Div. 8
(TISTE/JBM) OTS price $1.60

Army Electronics Research and Development Agency, Fort Monmouth, N. J.
DEVELOPMENT OF A QUALITY MEASUREMENT FOR VARACTOR DIODES AT MICROWAVE FREQUENCIES,
by Frank P. Senko. Nov 62, 16p. incl. illus.
(Technical rept. no. TR 2282)
Unclassified report

DESCRIPTORS: *Diodes (Semiconductor), Electric potential, Capacitance, Test methods, Electrical properties, Measuring devices (Electrical & electronic), Microwave frequency, Measurement, Microwave equipment.

A technique for characterizing the microwave varactor diode at microwave frequencies is described. Basically, this is a reflectometer type of technique that permits reasonable accuracy and speed of measurement without the need for standard Smith Chart plots and/or auxiliary (substitute) devices. The varactor parameters of major importance are specified. The limitations of the method are also included. (Author)

AD-402 095 Div. 8, 25
(TISTE/OHD) OTS price $5.60

Microwave Devices Lab., U. of Utah, Salt Lake City.
(No title).
Consolidated quarterly rept., 1 Oct-31 Dec 62.
31 Dec 62, 47p. incl. illus. 17 refs. (Technical rept. no. MDL-Q3)
(Contracts Nonr 128805, AF 04(647)745 and others)
Unclassified report

DESCRIPTORS: *Electron beams, *Solid state physics, *Plasma physics, Backward-wave oscillators, Waveguide windows, Standing-wave ratios, Mathematical analysis, Dielectrics, Microwave amplifiers, Lasers, Exhaust flames, Electromagnetic waves, Thermionic emission, Masers, Millimeter waves, Quantum mechanics, Measurement.

The broad purpose of the research activity reported herein is to extend the useful frequency spectrum into the range from microwave frequencies to optical frequencies, and to improve existing devices and techniques in the microwave spectrum. At present this objective is being pursued by studies of electron beam devices, solid state devices, and plasmas. (Author)

AD-402 101 Div. 8
(TISTA/GEC) OTS price $1.10

General Electric Co., Utica, New York.
QRC-139A AEROSPACE GROUND EQUIPMENT (AGE).
Monthly progress rept. no. 13, 14 Mar-8 Apr 63.
15 Apr 63, 7p.
(Contract AF 33(604)39443)
Unclassified report

DESCRIPTORS: *Radiofrequency spectroscopy, Frequency converters, S band, L band, Ground support equipment, Design, Circuits, Spectrum analyzers.

AD-402 105 Div. 8
(TISTE/JWS) OTS price $4.60

CBS Labs., Stamford Conn.
RESEARCH AND DEVELOPMENT OF SOLID STATE TUNNEL DEVICES AND ARRAYS CAPABLE OF OPERATION AT MICROWATT POWER LEVELS.
Interim development rept. no. 3, 1 Dec 62-28 Feb 63.
30 Mar 63, 1v. incl. illus. tables, 13 refs.
(Contract NObsr-87512)
Unclassified report

DESCRIPTORS: *Tunnel diodes, Arsenic alloys, Electric currents, Single crystals, Alloys, Chemical milling, Microwaves, Electrical properties, Electric potential, Electrical impedance, Gallium alloys.

A material study on GaAs is performed in view of its possible use for the fabrication of microwatt tunnel diodes. A technology of actually fabricating these devices is described. The experimental diodes exhibit a peak current of less than 10 microamps at an optimum value for the peak current density of 10 amps/sq cm, a peak-to-valley ratio of 6 to 10, and possess a theoretical switching time of about 0.1 microsec at approximately 0.5 pf junction capacitance. A discussion of the properties of the experimental microwatt tunnel diodes in the framework of the current theories on electron tunneling through a narrow p-n junction barrier is made. In some aspects agreement with theory is close; in others, it is poor. (Author)

AD-402 125 Div. 8
(TISTE/OHD) OTS price $1.00

RCA Defense Electronic Products, Camden, N. J.
A TELETYPEWRITER ADAPTER UNIT FOR THE DRISROTE APERTURED PLATE MEMORY.
Final rept., May-Dec 62.
15 Mar 63, 30p. incl. illus. (CR-63-591-2)
(Contract AF 33(657)7905, Proj. 4335)
(ASD TDR-62-1058) Unclassified report

DESCRIPTORS: *Teletype systems, *Computer storage devices, Switching circuits, Transistor amplifiers, Timing circuits, Computer logic, Input-output devices, Data processing systems.

This research was initiated to demonstrate the use of the DRISROTE equipment as a storage device for teletypewriter information. The particular teletypewriter used is a Kleinschmidt Model 120 which utilizes serial 7.42 unit Baudot Code. The DRISROTE equipment is an apertured plate memory capable of storing 15,360 bits of information with input and output rates up to one megacycle. To achieve the objective, an adapter was designed and constructed, and modifications were made to the teletypewriter and DRISROTE. Teletypewriter-generated messages were stored in DRISROTE, reconstituted, read out of DRISROTE, and printed by the teletypewriter with good fidelity. (Author)

AD-402 133 Div. 8
(TISTP/RD) OTS price $1.10

Rome U. (Italy).
MODES WITH COMPLEX PROPAGATION CONSTANT IN RECTANGULAR GUIDES LOADED WITH TRANSVERSELY MAGNETIZED LOSSLESS FERRITE,
by Giorgio Barzilai and Giorgio Gerosa.
20 June 62, 6p. incl. illus. (Technical note no. 5)
(Contract AF 61(052)101)
(AFCRL-63-79) Unclassified report

DESCRIPTORS: Waveguides, Theory, Ferrites.

The complete modal spectrum in the complex plane of the propagation constant for a rectangular guide partially filled with transversely magnetized lossless ferrite has been investigated and some numerical calculations have been carried out. (Author)

AD-402 154 Div. 8
(TISTP/FEM) OTS price $13.00

Sylvania Electric Products, Inc., Waltham, Mass.
TRANSFER FUNCTIONS IN MATHEMATICAL SIMULATION FOR RELIABILITY PREDICTION.
Final rept.
30 Jan 63, 175p. incl. illus. tables, 27 refs.
(Rept. no. F491-2)
(Contract AF 30(602)2376)
(RADC TDR 63-87) Unclassified report

DESCRIPTORS: *Reliability (Electronics), Mathematical models, Matrix algebra, Electronic equipment, Manufacturing methods, Aging (Materials), Microminiaturization (Electronics), Functions, Monte Carlo method, Computers, Programming (Computers), Statistical analysis.

The second phase of the study program for the development of techniques for predicting the reliability of electronic systems from statistical information about the performance of system components is summarized. The transfer functions developed in this phase are mathematical models of the actual systems to be evaluated. They are used to determine system performance when component characteristics vary from nominal values as a result of: (1) Manufacturing and handling, (2) Degradation due to age, (3) Internal and external random stresses. (Author)

AD-402 192 Div. 8
(TISTP/WH) OTS price $9.10

Naval Ordnance Lab., Corona, Calif.
TECHNIQUES FOR SYNCHRONIZING PULSE-CODE-MODULATED TELEMETRY,
by E. R. Hill. 1 Feb 63, 102p. incl. illus. tables, 11 refs.
(NAVWEPS Rept. no. 8139)
Unclassified report

DESCRIPTORS: *Telemetering transmitters, *Pulse modulation, *Pulse-locked communication systems, *Synchronization (Electronics), Phase measurement, Phase control devices.

A theoretical and experimental study was made of frame synchronization (sync) for non-return-to-zero pulse-code-modulated signals, including conditions where bit sync may not be stable. Criteria for sync pattern selection and for sync mechanization logic are treated for stable and unstable bit sync. Two types of sync pattern detectors are evaluated; the linear matched filter and the shift register recognizer. Techniques for finding sync patterns satisfying a given criterion are described. Effects of data-filter bandwidths on bit sync and bit detection are discussed. The results of a separate study are given, wherein bit sync is aided by an RF carrier coherent with the bit frequency. (Author)

AD-402 193 Div. 8, 26
(TISTM/EJH) OTS price $6.60

Westinghouse Electric Corp., Pittsburgh, Pa.
THEORETICAL AND EXPERIMENTAL RESEARCH TO ASSIST IN PREPARATION AND DESIGN OF A HIGH FREQUENCY SILICON CARBIDE ACTIVE DEVICE.
Final rept.,
by H. C. Chang. Dec 62, 60p. incl. illus. tables, 21 refs.
(Contract AF 19(604)8499, Proj. 4608)
(AFCRL 63-61) Unclassified report

DESCRIPTORS: *Transistors, *Semiconductors, *Manufacturing methods, Single crystals, Silicon compounds, Carbides, High frequency, Diffusion, Crystal growth, Crystal structure, Etched crystals, Vaporization.

For an active device to be usable at temperatures in excess of 500 C, it is necessary that the base material have a large band gap. SiC appears to be the most feasible material for use as a high-frequency device capable of operation at elevated temperatures. A unipolar transistor structure was investigated since a field effect device most nearly fits the peculiar capabilities of SiC. The device requirements are stringent and require a large degree of control over the crystal junction structure. This control is best effected by the epitaxial growth technique. Epitaxial layers were grown on hexagonal SiC seed crystals. The best layers possess a high degree of crystalline perfection and are quite pure. A study of the diffusion technique showed that by varying the various diffusion parameters, the usual complementary error function behavior of the diffusion front was changed. A gaseous etching technique is described which produces etched surfaces with a uniformity and smoothness previously unattainable. When used in conjunction with various masking techniques, this method appears to be feasible in the production of an active device structure. (Author)

AD-402 214 Div. 8, 20
(TISTE/CAM) OTS price $4.60

Harry Diamond Labs., Washington, D. C.
RADIATION RESISTANT ELECTRONICS.
Progress rept., 1 July - 31 Dec 62,
by O. L. Meyer, J. L. Scales and others.
31 Dec 62, 45p. incl. illus. 28 refs. (Rept. no. PR-63-1)
Unclassified report

DESCRIPTORS: *Triodes, *Diodes, *Films, *Semiconducting films, Electronic equipment, Field emission, Analysis, Theory, Vacuum apparatus, Amplifiers, Signal generators, Thermionic emission, Radiation damage.

A more detailed theoretical study has been made of the field emission process in thin-film devices than was made earlier. It was demonstrated in one example that increasing the dielectric constant of the emitter-base insulating layer from 1 to 3 could be expected to reduce the internal field emission current by two orders of magnitude. Improvements in the yield of functioning aluminum-aluminum oxide-aluminum tunneling sandwiches were realized when such sandwiches were overcoated with silicon monoxide, just after preparation. The experiment of Kahng, in which a mercury emitter electrode was used to establish the existence of hot electrons in thin-film active devices, was conducted with the objective being to duplicate Kahng's results and expand on his work by operating the device as an amplifier. Triode action was observed, but there was no voltage or power gain. A new technique was investigated for the fabrication of metal-interface amplifiers which was intended to completely eliminate the effect of pinholes in the insulating layer of these devices. This technique was not, however, successful. A number of improvements in laboratory instrumentation incident to this work are also described. (Author)

AD-402 260 Div. 8, 25
(TISTE/CAM) OTS price $1.60

Applied Research Inc., Port Washington, N. Y.
Quarterly rept., 1 Nov 62-31 Jan 63.
25 Mar 63, 11p. illus.
(Contract NObsr 81262)
Unclassified report

DESCRIPTORS: *Spectrum analyzers, *Radar receivers, *Radio receivers, *Noise analyzers, Intermediate frequency amplifiers, Preamplifiers, Electric potential, Direct current, Standing wave ratios, Measurement, Low pass filters, Band-width, Very high frequency, Ultrahigh frequency, Display systems, Microwave frequency, Radiofrequency spectroscopy.

Research is presented on the RF spectrum analyzer being developed for the visual display of amplitude and frequency of RF signals in the frequency range of 100 mc to 1000 mc. The frequency range of 100 mc to 1000 mc shall be displayed in four swept bands on a 5-inch oscilloscope screen. The spectroscope shall have sweep coverage up to 300 mc electronically with high resolution, with no spurious responses and no internally generated interference. It shall be useful as a search receiver, spectrum analyzer, noise interference analyzer or as monitoring equipment. (Author)

AD-402 261 Div. 8, 25
(TISTE/CAM) OTS price $2.60

Applied Research Inc., Port Washington, N. Y.
(No title).
Quarterly rept., 1 May-31 July 62.
30 Nov 62, 23p. incl. illus.
(Contract NObsr-81262)
Unclassified report

DESCRIPTORS: *Spectrum analyzers, *Radar receivers, *Radio receivers, *Noise analyzers, Electric potential, Electric currents, Frequency converters, Power supplies, Packaged circuits, Intermediate frequency amplifiers, Preamplifiers, Transistor amplifiers, Radiofrequency oscillators, Very high frequency, Ultrahigh frequency, Display systems, Microwave frequency, Radiofrequency spectroscopy.

Research is presented on the RF spectroscope being developed for the visual display of amplitude and frequency of RF signals in the frequency range of 100 mc to 1000 mc. The frequency range of 100 mc to 1000 mc shall be displayed in four swept bands on a 5-inch oscilloscope screen. The spectroscope shall have sweep coverage up to 300 mc electronically with high resolution, with no spurious responses and no internally generated interference. It shall be useful as a search receiver, spectrum analyzer, noise interference analyzer or as monitoring equipment. (Author)

AD-402 262 Div. 8, 25
(TISTE/CAM) OTS price $2.60

Applied Research Inc., Port Washington, N. Y.
(No title).
Quarterly rept., 1 Feb-30 Apr 62.
5 July 62, 19p. incl. illus.
(Contract NObsr 81262)
Unclassified report

DESCRIPTORS: *Spectrum analyzers, *Radar receivers, *Radio receivers, *Noise analyzers, Radio signals, Radar signals, Oscilloscopes, Cathode ray tube screens, Resolution, Packaged circuits, Control systems, Radiofrequency filters, Power supplies, Radiofrequency oscillators, Intermediate frequency amplifiers, Very high frequency, Ultrahigh frequency, Display systems, Microwave frequency, Radiofrequency spectroscopy.

Research is presented on the RF spectroscope being developed for the visual display of amplitude and frequency of RF signals in the frequency range of 100 mc to 1000 mc. The frequency range of 100 mc to 1000 mc shall be displayed in four swept bands on a 5-inch oscilloscope screen. The spectroscope shall have sweep coverage up to 300 mc electronically with high resolution, with no spurious responses and no internally generated interference. It shall be useful as a search receiver, spectrum analyzer, noise interference analyzer or as monitoring equipment. (Author)

AD-402 277 Div. 8, 30
(TISTE/CAM) OTS price $6.60

New York U., N. Y.
ON PROJECTS DEALING WITH ADVANCED ELECTRON DEVICE TECHNOLOGY.
Feb 63, 56p. (Status rept. no. 73)
(Contract DA 36-039-sc-89076)
Unclassified report

DESCRIPTORS: *Electronic equipment, *Electronics, *Scientific research, Ceramic capacitors, Glass capacitors, Triodes, Cathode ray tubes, Magnetrons, Camera tubes, Storage tubes, Phase shifters, Transistors, Electron guns, Semiconductor devices, Resistors, Amplifiers, Thyratrons, Semiconducting films, Radiation damage, Reliability (Electronics), Radar duplexers.

AD-402 314 Div. 8
(TISTE/JWS) OTS price $7.60

Innsbruck U., Austria.
ON THE PROPAGATION OF VLF WAVES IN SOLIDS.
Technical annual summary rept. no. 2,
by W. Bitterlich. 20 Dec 62, 66p. illus.
(Contract AF 61(052)490)
(AFCRL 63-100) Unclassified report

DESCRIPTORS: *Electromagnetic waves, *Propagation, Very low frequency, Electrical conductance, Dipole antennas, Loop antennas, Underground structures, Radio receivers, Radio transmitters, Magnetic fields, Damping, Electromagnetic fields, Electromagnetic properties, Transistors, Earth.

A thorough theoretical study of the propagation of VLF-waves in homogeneous conducting media was performed. The formulas and diagrams deduced for the electromagnetic fields of a magnetic dipole and quadrupole are given in terms of distance, conductivity, and the positions of the transmitting and receiving aerials. From these, a technique of determining the conductivity of geological conductors could be worked out. A description is given of the measurements of the intensities of our own and of commercial transmitters as well as of the required measuring equipment. The results of experiment and theory are explained in detail and compared with one another. (Author)

AD-402 319 Div. 8, 26
(TISTE/CAM) OTS price $2.60

General Electric Co., Schenectady, N. Y.
PRODUCTION ENGINEERING MEASURE FOR VOLTAGE-TUNABLE MAGNETRONS.
Quarterly progress rept. no. 3, 19 Oct 62-18 Jan 63,
by W. M. Piwnica. 4 Mar 63, 27p. incl. illus. table.
(Contract DA-36-039-sc-86722)
Unclassified report

DESCRIPTORS: *Magnetrons, *Manufacturing methods, Electric potential, Packaged circuits, Noise (Radio), Vibration, Cavity resonators, Capacitance, Brazing, Hydrogen, Low frequency, Anodes, Analysis, Processing, Tuned circuits.

A significant improvement in performance of the low-frequency package was achieved. Progress with respect to noise performance of both packages is presented. Preliminary electrical data indicates that the hydrogen-brazed version is comparable to the vacuum-brazed tube. The low-frequency package was redesigned to increase the center frequency about 150 megacycles. Eleven electrical samples were delivered and problems with these are discussed. The analysis of processed electrical-discharge machined anodes is presented. (Author)

AD-402 327 Div. 8
(TISTP/RD) OTS price $2.60

Airborne Instruments Lab., Inc., Deer Park, N. Y.
SUBMILLIMETER WAVE COMPONENT DEVELOPMENT.
Quarterly rept. no. 2,
by O. F. Hinckelmann, H. J. Hindin, and J. J. Taub. Jan 63, 17p. illus. 3 refs. (Rept. no. 2098-I-2)
(Contract AF 30(602)2758)
(RADC TDR 63-52) Unclassified report

DESCRIPTORS: *Microwave equipment, *Millimeter waves, Radar duplexers, Phase shifters, Waveguides, Waveguide couplers, Radiofrequency, Attenuators, Diffraction gratings, Prisms (Optics), Extremely high frequency.

Techniques for the design, construction, and evaluation of a 10-db directional coupler, a 0 to 40 db variable attenuator, a 90-degree phase shifter, and a duplexer to operate in the submillimeter region were investigated theoretically and experimentally. Oversize-waveguide quasi-optics has been chosen as the technique to be pursued on the basis of theoretical studies and data obtained in the submillimeter region. Prototypes of all of these components except the duplexer have been constructed. A generation and detection scheme has been constructed and is being evaluated for the submillimeter frequencies. Successful tests of components have been made at 125, 240, and 330 Gc. (Author)

AD-402 353 Div. 8, 26
(TISTE/CAM) OTS price $2.60

Lewis, E. B., Co. Inc., East Hartford, Conn.
PRODUCTION ENGINEERING MEASURES CRYSTAL UNIT CR-(XM-46)/U.
Quarterly rept. no. 2, Nov 62-Feb 63,
by Robert P. McComb. Feb 63, 12p. incl. illus. table.
(Contract DA 36-039-sc-86737)
Unclassified report

DESCRIPTORS: *Crystal filters, *Quartz, *Manufacturing methods, Configuration, Electrodes, Tungsten, Aluminum, Evaporation, Plating, High frequency, Very high frequency, Electrical properties, Chemical milling, Processing.

Improved design data for AT Cut Quartz Crystals for filter application, operating on the third overtone at 30 MC are given. Details of final lapping and polishing operation are outlined as are the plating techniques for all aluminum electrode unit. A comparison of electrical parameters is given. (Author)

AD-402 397 Div. 8
(TISTE/CAM) OTS price $1.60

Microwave Associates, Inc., Burlington, Mass.
APPLICATION OF SEMICONDUCTOR DEVICES TO HIGH POWER DUPLEXERS.
Quarterly progress rept. no. 3, 1 Aug-31 Oct 62,
by Joseph White. 7 Feb 63, 10p. incl. illus. table.
(Contract AF 30(602)2656, Proj. 4506)
(RADC TDR 63-88) Unclassified report

DESCRIPTORS: *Semiconductor devices, *Diodes (Semiconductors), Microwave frequency, Nonlinear systems, Power, Packaged circuits, Limiters, Thermal stresses, Radar duplexers

Semiconductor duplexing techniques which show promise for extending the power handling capability of semiconductors when used as duplexers are recommended. The following aspects are presented: (1) the building of packaged PIN diodes to meet the design criteria; (2) the design and building of an integrated semiconductor duplexer structure to maximize the heat dissipation and power handling capabilities of the structure; and (3) design of the semiconductor junction to minimize the thermal dissipation, the turn-on time, and the series resistances. The progress made on these aspects is described. (Author)

AD-402 408 Div. 8
(TISTM/EJH) OTS price $1.60

Antenna Lab., Ohio State U., Research Foundation, Columbus.
APPLICATION OF ELECTROMAGNETIC ABSORBING MATERIALS AS INTERFERENCE REDUCTION TECHNIQUES.
Interim Engineering rept., 6 Mar-5 Sep 62,
by L. Peters, Jr., R. C. Rudduck and P. M. Russo. Mar 63, 11p. incl. illus. 6 refs.
(Contract AF 30(602)2711, Proj. 4540)
(RADC-TDR-63-7) Unclassified report

DESCRIPTORS: *Antenna radiation patterns, *Radiofrequency interference, Antenna feeds, Lens antennas, Parabolic antennas, Electromagnetic waves, Absorption, Materials.

The use of radar absorber material is being considered for reduction of radio-frequency interference (RFI). The study of side-lobe reduction is being applied to three antenna types: the paraboloid reflector, the Luneberg lens, and the horn antenna. A method is proposed for the design of a null in the Fresnel zone for the purpose of RFI reduction with a small antenna located in the null. (Author)

AD-402 409 Div. 8, 15
(TISTW/JEA) OTS price $1.60

Electron Physics Lab., U. of Michigan, Ann Arbor.
EFFICIENCY ENHANCEMENT BY PHASE FOCUSING AND COLLECTOR DEPRESSION,
by J. E. Rowe. Sep 62, 9p. incl. illus. tables, 4 refs. (Technical rept. no. 53)
(Contract AF 30(602)2834, Proj. 5573)
(RADC-TDR-62-470) Unclassified report

DESCRIPTORS: *Traveling-wave tubes, *Backward wave oscillators, *Klystrons, Non-linear systems, Mathematical predictions, Wave transmission, Velocity, Circuits, Traveling-wave electron accelerators, Radiofrequency power, Energy, S band, Numerical analysis, Power amplifiers, Waveguides, Experimental data, Electron beams, Electron accelerators, Reliability (Electronics), Mathematical analysis.

A theoretical study of the efficiency enhancement possible through collector segmentation and depression is made using information obtained from the nonlinear interaction theory for traveling-wave-like devices. The velocity characteristics of the spent beam are used directly to calculate the improvement factors and the optimum collector segment potentials as functions of various operating parameters. Specific calculations are made for both maximum gain and maximum power output operating conditions. Also efficiency improvement through phase focusing is discussed and experimental data are given and correlated with the theoretical predictions. It is found that improvement factors of approximately 1.5 to 2 are predicted, and similar results are obtained experimentally. Results are also given for the backward-wave oscillator, for which the improvement factor is higher due to the low interaction efficiency and the corresponding low velocity spread in the spent beam. (Author)

AD-402 461 Div. 8, 7
(TISTE/JWS) OTS price $6.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
HEAT AND POWER ENGINEERING (SELECTED ARTICLES).
14 Mar 63, 62p. incl. illus. tables, 15 refs.
(Trans. no. FTD-TT-62-1656 from Teploenergetika, No. 3, pp. 100-107, 116-128, 137-163, 1961)
Unclassified report

DESCRIPTORS: *Photoelectric cells (Semiconductor), *Solar cells, *Refectors, *Batteries and components, Photoelectric materials, Impurities, Alloys, Crystals, Surface properties, Boron, Phosphorus, Chemical milling, Hall effect, Electric potential, Diffusion, Recombination reactions, Electric currents, Solar panels, Optical tracking, Silicon, Electrical properties.

AD-402 465 Div. 8
(TISTE/JWS) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
MEASURING THE PARAMETERS OF ANTENNA-FEEDER DEVICES (SELECTED PARTS),
by A. Z. Fradin and Ye. V. Ryzhkov. 26 Mar 63, 13p. incl. illus. (Trans. no. FTD-TT-63-42 from Izmereniye Parametrov Antenno-Fidernykh Ustroystv, Moskva, pp. 266-272, 314-316, 1962)
Unclassified report

DESCRIPTORS: *Antenna radiation patterns, Airplanes, Helicopters, Airplanes antennas, Radio receivers, Radio transmitters, Tracking, Electrical impedance, Measurement.

9. FLUID MECHANICS

AD-401 105 Div. 9
(TISTP/JP) OTS price $4.60

Aerophysics Co., Washington, D. C.
A SOLUTION OF THE TWO-DIMENSIONAL TURBULENT VISCOUS CURVED JET USING THE IBM 7090 COMPUTER,
by Gabriel D. Boehler. Nov 61, 44p. incl. illus. tables, 7 refs. (Rept. no. AR 61-03)
(Contract Nonr-2747(00))
(TRECOM Technical rept. 63-14)
Unclassified report

DESCRIPTORS: *Ground effect machines, *Jets, *Jet mixing flow, Velocity, Viscosity, Numerical analysis, Programming (Computers), Stability, Turbulence, Mathematical analysis.

AD-401 112 Div. 9
(TISTE/OHD) OTS price $9.10

Hydrodynamics Lab., Mass. Inst. of Tech., Cambridge.
FLOW-INDUCED VIBRATION OF FLAT PLATES: THE MECHANISM OF SELF-EXCITATION,
by P. S. Eagleson, J. W. Daily and G. K. Noutsopolous. Feb 63, 91p. incl. illus. tables, 44 refs. (Rept. no. 58; Rept. no. R-62-36)
(Contract Nonr-184121, Proj. S-R009 01 01)
Unclassified report

DESCRIPTORS: *Flat plate models, *Vibration, Resonance, Damping, Wake, Instrumentation, Test equipment (Electronics), Mathematical analysis, Water tunnels.

Study is made of the vibrational behavior of flat plates when placed parallel to a uniform stream and allowed one degree of freedom torsional oscillation around a vertical axis through their leading edge. The experimental work was carried out in the 7-1/2 in. x 9 in. test section of an open-circuit water tunnel. Four test plates were used, each 1/4 inch thick and 2 inches in chord, but having different trailing edge geometries. Measurements were made of the amplitude and frequency of plate vibration and of the fluctuating total head in the wake over the range of free-stream velocity producing significant vibrational excitation. Measurable vibrations were found to occur in three distinct regions surrounding the natural resonant frequencies of the system. An equation of motion of the plate-spring system is developed incorporating the hydrodynamic loads given by the linearized potential theory, and unknown, vortex-induced, forcing moments. Using this linear model and the experimental data, forcing moment coefficients are obtained which show a unique (for all plates) and piecewise linear dependence upon a self-excitation parameter consisting of the mean transverse velocity of the trailing edge to the free-stream velocity. (Author)

AD-401 139 Div. 9, 30
(TISTP/GRW) OTS price $7.60

Aerospace Corp., Los Angeles, Calif.
TEST TIME IN LOW PRESSURE SHOCK TUBES,
by Harold Mirels. 27 Dec 62, 70p. incl. illus. tables, 18 refs. (Rept. no. TDR 169(3230-12)TN-5)
(Contract AF 04(695)-169)
(SSD-TDR-62-204) Unclassified report

DESCRIPTORS: *Shock tubes, *Laminar boundary layer, *Gas flow, Shock waves, Velocity, Time, Reduction, Test methods, Integration, Pressure.

The reduction of test time in low pressure shock tubes, due to a laminar wall boundary layer, was analytically investigated. The shock moves with uniform velocity, and the flow was investigated in a shock-fixed co-ordinate system. The variation of free stream conditions between the shock and contact surface was taken into account. It was found that, beta, a parameter, is considerably larger than the estimates made except for very strong shocks. Since test time is proportional to beta, previous estimates of test time are too large, particularly for weak shocks. The present estimates for 1/beta squared appear to agree with existing experimental data to within about 10% for shock Mach numbers greater than 5. (Author)

AD-401 146 Div. 9, 15
(TISTP/WH) OTS price $4.60

Cornell Aeronautical Lab. Inc., Buffalo, N. Y.
A STUDY OF FINITE-DIFFERENCE METHODS AS APPLIED TO HYPERSONIC VISCOUS SHOCK-LAYER EQUATIONS,
by Angela L. Chang and Hsiu K. Cheng. Mar 63, 35p. incl. illus. 15 refs. (Rept. no. AF-1285-A-9)
(Contract Nonr-265300)
Unclassified report

DESCRIPTORS: *Hypersonic flow, *Shock waves, *Difference equations, Integration, Partial differential equations, Conical bodies, Viscosity.

The examples worked out here for flows over cones confirm that the implicit and DuFort-Frankel explicit schemes, which are not subject to the stability requirement, are more effective. Although the difference between the two latter schemes is not large in this example, the discussion reveals that the implicit scheme, which is subject to neither the stability nor the convergence requirement, is much more efficient and accurate in problems involving non-vanishing pressure gradients. (Author)

AD-401 162 Div. 9
(TISTP/GRW) OTS price $6.60

California Inst. of Tech., Pasadena.
FLOW PAST A PARTIALLY CAVITATING CASCADE OF FLAT PLATE HYDROFOILS,
by R. B. Wade. Jan 63, 31p. illus. 9 refs.
(Rept. no. E-79-4)
(Contract Nonr-220(24))
Unclassified report

DESCRIPTORS: *Hydrofoils, *Hydrodynamics, Lift, Flat plate models, Fluid flow, Perturbation theory, Transformations (Mathematics), Theory, Cavitation.

A linearized theory was presented for the partial cavitation in a cascade of flat plates. The results were presented so that they may be useful as a guide in the design of turbomachines and other applications. From the results, it is possible to determine the cavity length, lift coefficient and downstream conditions for any desired cavitation condition for a given specific cascade geometry and initial upstream conditions. The limitations of the theory are stressed and it is shown that the cascade effect diminishes the singular behavior at the end of the cavity. In the case of the isolated foil the theory holds good up to a ratio of cavity length to chord length of about 0.74, whereas in the cascade flow this ratio varies from about 0.8 for small solidities up to 0.95 for larger solidities. For solidities of 0.5 and over, the cascade effect is appreciable and cascade interference effects cannot be neglected in this range. For solidities smaller than 0.5 the cascade effect is relatively small and the isolated case may be used as a fairly good approximation provided that the mean conditions are taken as reference quantities. (Author)

AD-401 321 Div. 9, 30
(TISTP/WH) OTS price $.75

Harry Diamond Labs., Washington, D. C.
FLUID AMPLIFICATION,
by E. V. Hobbs. 8 Mar 63, 29p. incl. illus.
(Rept. no. TR-1114)
(Proj. DA-5N03-01-003)
Unclassified report

DESCRIPTORS: *Computer logic, *Hydraulic systems, *Pneumatic systems.

Descriptions are given of the operation of various fluid logic elements--singly and in combination. (Author)

AD-401 339 Div. 9
(TISTA/GEC) OTS price $5.60

RAND Corp., Santa Monica, Calif.
HYPERSONIC STRONG VISCOUS INTERACTION OF A FLAT PLATE WITH SURFACE MASS TRANSFER,
by Ting-Yi Li and Joseph F. Gross. Mar 63, 49p. incl. illus. 13 refs. (Research memo. no. RM-3000-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Flat plate models, Laminar flow, Heat transfer, Laminar boundary layer, Injection, Coolants, Cooling, Hypersonic characteristics

Advances in the design of hypersonic vehicles can be realized only if the structural and thermal problems engendered by the high surface-heating rates are alleviated. The injection of a coolant into the boundary layer on the surface of a vehicle, i.e., mass-transfer cooling, is one method for reducing heating rates. The problem of a hypersonic flow on a flat plate with surface mass transfer was examined to determine the significant parameters which affect the solution. This work was the beginning of a general study of hypersonic flow with mass-transfer cooling. (Author)

AD-401 375 Div. 9, 25
(TISTP/JW) OTS price $4.60

Free U., Berlin (Germany).
THE HYDRODYNAMIC EQUATIONS FOR DI-ATOMIC, EXCITED AND DISSOCIATED GASES AS APPROXIMATIONS OF THE BOLTZMANN EQUATIONS DESCRIBING SUCH GASES. PART I.
Technical rept. no. 5,
by G. Ludwig. 15 Nov 62, 40p. 14 refs.
(Grant AF EOAR 62-48)
(AFOSR 4590) Unclassified report

Division 9 - FLUID MECHANICS

DESCRIPTORS: *Gas flow, Density, Integral equations, Density, Fluid mechanics, Stabilization systems, Vector analysis.

Boltzmann equations for diatomic, excited and dissociated gases were treated by a generalized GRAD method to gain macroscopical transport equations which correspond to the Navier-Stokes equations. Neither chemical equilibrium nor equilibrium between the internal translational degrees of freedom is assumed. The connection between the wanted coefficients of viscosity and heat conduction and certain collision-integrals is given explicity.

AD-401 546 Div. 9
(TISTP/WH) OTS price $3.60

Mathematics Research Center, U. of Wisconsin, Madison.
ON THE STABILITY OF A MACLAURIN SPHEROID OF SMALL VISCOSITY,
by P. H. Roberts and K. Stewartson. Feb 63, 31p. 12 refs. (MRC technical summary rept. no. 373)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Liquids, *Gravity, *Fluid mechanics, *Hydrodynamics, Centrifugal fields, Rotation, Stability.

The stability of a viscous Maclaurin spheroid is solved asymptotically for small kinematic viscosity, ν. It is shown that, in this limit, the frequency of oscillation, n, with respect to the mode which becomes neutrally stable in the absence of viscosity at the point of bifurcation (where the eccentricity, e, of the meridional section is approximately 0.8127), is

$$n = n_0 + i\,\frac{5\nu n_0^2}{\Phi(e)} + O(\nu).$$

In the foregoing formula n_0 denotes the frequency in the absence of viscosity, a the radius of the equational section and $\Phi(e)$ a certain function of e, which changes sign at e = 0.8127 and is positive for smaller values of e. From equation (1) it follows that the Maclaurin spheroid is indeed unstable beyond the point of bifurcation when viscosity is present. (Author)

AD-401 548 Div. 9, 20
(TISTP/WH) OTS price $3.60

Naval Ordnance Lab., White Oak, Md.
BOUNDARY DISTURBANCES NEAR AN UNDERWATER EXPLOSION BUBBLE,
by William G. Zuke. Mar 63, 30p. incl. illus. tables, 10 refs.
(NAVORD rept. 6877) Unclassified report

DESCRIPTORS: *Underwater explosions, *Bubbles, *Cables mechanical, *Nuclear explosions, Radiological contamination, Simulation.

High speed photographs of a number of underwater explosions of 0.2-gram lead azide charges were made. For moderately deep explosions (where the charge depth is one to two maximum bubble radii), water jets above the surface and tubes of air extending down from the surface appeared at points where cables penetrated the surface. Similar phenomena were observed when cables were not present; however, the magnitudes were generally smaller. The occurrence of these phenomena is qualitatively related to Taylor's Instability Theory. If the characteristics of the model explosions of this study are presumed to scale geometrically full-scale nuclear explosions, it can be tentatively concluded that: For moderately deep explosions, atmospheric air flows into the tubes and toward the explosion bubble, and the most likely effect is somewhat increased mixing of radioactive products with the water. (Author)

AD-401 551 Div. 9
(TISTP/WH) OTS price $1.60

Institute of Engineering Research, U. of Calif., Berkeley.
ON THE STABILITY OF VISCOUS FLOW BETWEEN ROTATING CYLINDERS; FINITE GAP.
by Lionel Rintel and Paul Lieber. 1 Feb 63, 10p. incl. tables, 11 refs. (Rept. no. MD-63-1)
(Contract Nonr-22287)
Unclassified report

DESCRIPTORS: *Couette flow, *Convection, *Fluid flow, Temperature, Stability, Viscosity.

A Mean Taylor Number is here introduced as a characteristic parameter governing stability of viscous flows between concentric rotating cylinders separated by a finite gap. This parameter is constructed on the basis of the forces causing convection and their mode of contribution to the instability. In particular for gaps equal to the radius of the inner cylinder considered by Chandrasekhar, it is found that the critical values of this Mean Taylor Number obey the laws governing the critical Taylor Number in the case of the small gap. (Author)

AD-401 588 Div. 9
(TISTP/FEM) OTS price $1.60

Foreign Tech Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CALCULATION OF A TRANSVERSE CROSS SECTION BY A METHOD OF CHARACTERISTICS,
by G. A. Sokolovskiy. 1 Mar 63, 13p. incl. illus. 5 refs. (Trans. no. FTD-TT-62-1739 from Energomashinostroyeniye, no. 12, pp. 22-24, 1961.
Unclassified report

DESCRIPTORS: *Supersonic characteristics, *Gas flow, Supersonic flow, Supersonic airfoils, Velocity, Pressure, Boundary layer, Turbines, Shock (Mechanics), Airfoils.

Consideration is given to a method of constructing a flow spectrum in a transverse cross section by calculating the curvature of the back of the airfoil and of the root compression shock. Calculations for TN-2-II airfoils are compared with experimental results. (Author)

AD-401 590 Div. 9
(TISTP/JW) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CALCULATING A THREE-DIMENSIONAL LAMINARY BOUNDARY LAYER ON SPREADING LINES,
by V. S. Avduyevskiy. 15 Feb 63, 14p. incl. illus. 4 refs. (Rept. no. FTD-TT-62-1723 from Russian Periodical, Izvestiya Akademii Nauk SSR, Otdeleniye Tekhnicheskikh Nauk, Mekhanika I Mashinostroeniye, no. 1, pp. 32-41, 1962)
Unclassified report

DESCRIPTORS: *Laminar boundary layer, Angle of attack, Cylindrical bodies, Compressible flow, Heat exchangers, Gases, Fluid flow.

AD-401 684 Div. 9, 25
(TISTP/WH) OTS price $4.50

Mathematics Research Center, U. of WISCONSIN, Madison.
MAGNETO-FLUID DYNAMICS OF BODIES IN ALIGNED FIELDS,
by K. Stewartson. Nov 62, 41p. incl. illus. 10 refs. (MRC technical summary rept. no. 360)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Magnetohydrodynamics, *Fluid mechanics, *Solids, Drag, Magnetic fields, Fluid flow, Integral equations, Partial differential equations.

The motion of a perfectly conducting fluid past a fixed body in the presence of an aligned magnetic field can be regarded as the limit of a number of problems, viz: (1) when the fluid is a finite conductor, (2) an unsteady problem, (3) the magnetic and velocity fields are not parallel at infinity. The limits of these more general problems agree in predicting a force on the body and on the existence of upstream and downstream wakes. However, if the magnetic field is fairly strong, (1) does not predict a downstream wake while (2) and (3) do. An attempt to reconcile these limit results is made here. In the first part it is shown that the unsteady problem associated with a finitely conducting fluid and an aligned field is non-unique, but that by making an appeal to the theory of real fluids the conclusion of (1) and (2) can be obtained as special cases of the general solution. In the second part the steady problem, assuming that the conductivity is finite and the magnetic field is nearly aligned, is considered and it is shown that the flow fields predicted in (1) and (3) are limiting cases of this more general problem. The manner of the changeover from the solution for (1) to that for (3) is elucidated. (Author)

AD-401 731 Div. 9
(TISTP/JW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
AC-ELECTRIC ARC INSTALLATION FOR THE OBTAINMENT OF HIGH TEMPERATURE GAS FLOW,
by V. S. Pelevin. 13 Feb 63, 9p. incl. illus. 7 refs. (Trans. no. FTD-TT-62-1753 from Inzhenerno-Fizicheskiy Zhurnal, No. 12, pp. 32-36, 1961)
Unclassified report

DESCRIPTORS: *Fluid flow, *Electric discharges, Intensity, Thermal conductivity, Gases, High temperature research.

The nature of the phenomena taking place in an electric arc and the basic principles of obtaining a high-temperature gas flow with the aid of an arc are explained. A detailed description is given of the device and its construction. Operational parameters of aggregates are listed. (Author)

AD-401 744 Div. 9
(TISTP/FEM) OTS price $2.60

Foreign Tech. Div., Air Force Systems, Command, Wright-Patterson Air Force Base, Ohio.
APPLICATION OF THE ASYMPTOTIC METHOD OF CERTAIN PROBLEMS OF THE DYNAMICS OF VEHICLES,
by V. A. Yaroshevskiy. 14 Mar 63, 20p. incl. illus. 7 refs. (Trans. no. FTD-TT-63-164 from Russian Periodical, Inzhernerhyy Zhurnal, 2:2, pp. 211-221, 1962)
Unclassified report

DESCRIPTORS: *Adiabatic gas flow, *Dynamics Velocity, Periodic variations, Functions, Integral equations, Differential equations, Partial differential equations, Vehicles.

The rule of the conservation of the adiabatic invariant is reduced to a compact form. Problems concerning orbital decay of a satellite, the skip-glide motion of a glider, and the oscillations of a vehicle about the center of mass on a flight path with a variable velocity are examined using these formulas. (Author)

AD-401 882 Div. 9, 30
(TISTE/OHD) OTS price $3.60

Berlin Towing Tank (Germany).
ON OSCILLATING HYDROFOILS. PART II,
by S. Schuster and H. Schwanecke. June 62, 12p. illus. tables, 7 refs.
(Contract N62558-2552)
Unclassified report

DESCRIPTORS: *Hydrofoils, *Oscillation, Hydrodynamics, Model basins, Test equipment, Measurement, Mathematical analysis, Theory, Oscillation, Hydrofoils.

The report contains the results of the experimental investigations of the unsteady components of the hydrodynamic forces, i.e. the hydrodynamic exciting forces and the hydrodynamic masses and damping forces. The tests were carried out with foil models, namely a plane foil with an aspect ratio A = 5 and a chord length c = 0.1 m and a dihedral foil with the dihedral angle = 30 deg. and a chord length c = 0.1 m. (Author)

AD-401 893 Div. 9, 15, 30
(TISTP/PCR) OTS price $2.60

Cruft Lab., Harvard U., Cambridge, Mass.
SOLVING THE EQUATIONS OF UNIFORM FLOW.
Technical rept.,
by William F. Pickard. 15 Jan 63, 23p. incl. illus. 4 refs. (Technical rept. no. 400)
(Contract Nonr-186632, Proj. NR-371-016)
Unclassified report

DESCRIPTORS: *Fluid flow, *Programming (Computers), Fluid mechanics, Hydrodynamics, Mathematical analysis, Programming languages, Integrals, Integral equations, Polynomials, Complex variables, Equations.

The problem of solving the equation for uniform flow in an open channel is reduced to that of evaluating three simple integrals. Practical methods of computing these integrals are discussed. (Author)

AD-401 909 Div. 9, 12
(TISTA/GEC) OTS price $5.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
THE AERODYNAMIC CHARACTERISTICS OF THREE ELLIPTICAL-CONE LIFTING BODIES AT TRANSONIC SPEEDS,
by W. E. Carleton and R. K. Matthews. Apr 63, 41p. incl. illus. 2 refs. (Rept. no. AEDC-TDR-63-53)
(Contract AF 40(600)1000)
Unclassified report

DESCRIPTORS: *Conical bodies, *Ellipsoids, *Blunt bodies, *Nose cones, Aerodynamic characteristics, Model tests, Wind tunnel models, Re-entry vehicles, Pitch (Motion), Roll, Lift, Transonic characteristics.

Tests were conducted on three elliptical-cone, lifting-body, re-entry configurations at Mach numbers from 0.60 to 1.40. The longitudinal and lateral aerodynamic characteristics of the three blunt cones of elliptic cross section were investigated at angles of attack from -4 to +12 deg for constant yaw angles of 0, 5.6, and 10.3 deg. The results from tests on the ASD blunt nose configurations, 1-A and 1-D, and the elongated, less blunt nose configuration, 1-E, showed that all configurations exhibited similar trends in longitudinal and lateral aerodynamic characteristics and that the most aft location of center-of-gravity for all configurations would be limited by yaw center-of-pressure location. The most blunt configurations indicated a maximum axial force at some Mach number greater than 1.4, whereas the elongated nose configuration exhibited a maximum axial force near Mach number 1.1. (Author)

AD-401 918 Div. 9
(TISTA/GEC) OTS price $3.60

Mississippi State U., State College.
SOME ENTRAINMENT PROPERTIES OF A TURBULENT AXI-SYMMETRIC JET,
by George Naim Faris. 15 Jan 63, 10p. illus. 12 refs. (Research rept. no. 39)
(Contract Nonr-97803)
Unclassified report

DESCRIPTORS: *Axially symmetric flow, Theory, Jet mixing flow, Mathematical analysis, Laminar flow, Wake, Experimental data, Boundary layer.

Experiments were performed to verify the extension of Cole's Wake Law (J. Fluid Mech., vol. 1, London, 1956) for two-dimensional boundary layers to the case of axi-symmetric free jet flows. (Author)

AD-401 925 Div. 9
(TISTP/MC) OTS price $4.60

Technical Research Group, Syosset, N. Y.
CAVITY SHAPE AND DRAG IN VENTILATED FLOW; THEORY AND EXPERIMENT,
by Peter Thomsen. Feb 63, 37p. incl. illus. 2 refs. (Rept. no. TRG-156-SR-2)
Unclassified report

DESCRIPTORS: *Fluid dynamics, *Fluid flow, Drag.

A three-dimensional analytic approach to predicting cavity length is offered. Also, comparison is made of the theoretical results with length measurements that were made in cavity side photos published by B. Perry and A. D. Hay. In the analysis of the Hay experiments special emphasis was placed on the different flow states that can be observed with increasing speed. For instance, at high speed, the strut cavity is sealed off from the atmosphere by the surface flow, causing a change in flow state. The results obtained for cavity length can be used as a guide for developing further the theory of cavity shape. Such theory may form the basis for a three-dimensional drag analysis. Furthermore, information about cavity shape may be applicable to the design of a strut-hydrofoil-system. The most practical way of providing the ventilation required by a hydrofoil cavity is to have the strut cavity open to atmospheric air, and to have it reach down to the strut-base for supercavitating foils or to the strut-and foil-base for base-ventilated foils. (Author)

AD-402 012 Div. 9
(TISTP/MC) OTS price $9.10

National Magnet Lab., Mass. Inst. of Tech., Cambridge.
TWO PHASE FLOW IN CAPILLARY TUBES,
by Mikio Suo, and Peter Griffith. Mar 63, 77p. incl. illus. 20 refs. (Technical rept. no. 8581-24)
(Contract AF 19(604)7344)
Unclassified report

DESCRIPTORS: *Phase studies, *Capillary tubes, Fluid flow, Gas flow, Test methods, Test equipment, Fluid mechanics, Viscosity, Bubbles.

The study of two-phase flow is important in heat transfer and fluid mechanics. The flow of two phases, gas and liquid, has been studied in horizontal tubes of capillary diameter. The flow has been primarily studied in the regime where the gas flows as long bubbles separated from the wall of the tube by a liquid film and from each other by slugs of liquid. In this regime the pressure drop, density and, to a certain extent, the thickness of the liquid film around a bubble have been correlated. The conditions under which the long bubble flow can exist and under which the correlations are valid have been determined. Of special interest is that the correlations should be valid in a zero-gravity field. (Author)

AD-402 188 Div. 9
(TISTE/CAM) OTS price $2.60

Hughes Tool Co., Culver City, Calif.
INTRODUCTION TO THE HUGHES HYDROSTREAK CONCEPT,
by R. T. DeVault. 10 Nov 59, 13p. illus. 3 refs. (Rept. no. X-424)
Unclassified report

DESCRIPTORS: *Ground effect machines, Design, Hydrodynamic configuration, Aerodynamic configuration, Aerodynamic characteristics, Drag, Fluid mechanics, Theory, Velocity, Test methods, Hydrodynamics.

The basis of the Hughes Hydrostreak design concept of water-wall vehicles is discussed. The fundamental theory is given, comparisons are made with air-wall vehicles, and preliminary test data are presented. A typical design study is shown, illustrating the advantages of the Hydrostreak concept over the air-wall system and demonstrating the high over-water speeds attainable with moderate power inputs. (Author)

AD-402 416 Div. 9, 30
(TISTP/PCR) OTS price $2.60

Institute of Engineering Research, U. of Calif., Berkeley.
FLAT PLATE SKIN FRICTION IN LOW DENSITY HYPERSONIC FLOW PRELIMINARY RESULTS.
Report on Aerothermodynamic Investigation in High Speed Flow,
by E. S. Moulic. Feb 63, 23p. incl. illus. table, 8 refs.
(Contract AF 33(657)8607, Proj. 7064)
(ARL 63-24) Unclassified report

DESCRIPTORS: *Flat plate models, *Hypersonic flow, Tests, Test equipment, Balances, Tables, Friction.

Experimental local skin friction data were obtained for the strong interaction region of

a sharp-edged adiabatic flat plate model over the flow parameter ranges $5.5 < M < 6.0$, $150 < Re < 400$, $9.8 < X < 13.0$. These data, the results of the first trials of a complex experimental apparatus, yield local skin friction coefficients significantly below the predictions of strong interaction theory. (Author)

AD-402 423 Div. 9, 25
(TISTW/JEA) OTS price $3.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
EXPERIMENTAL STUDY OF THE TURBULENT BOUNDARY LAYER IN GAS MOTION IN AXISYMMETRICAL DIFFUSERS WITH COOLED WALLS,
by P. N. Romanenko and A. I. Leont'yev.
25 Mar 63, 31p. incl. illus. 15 refs. (Trans. no. FTD-TT-63-74 from Russian Book, Moskovskogo Instituta Inzhenerov, Zhelesnoderoshnyy Transport, no. 139, pp. 134-158, 1961)
Unclassified report

DESCRIPTORS: *Turbulent boundary layers, *Diffusers, *Gas flow, Numerical methods and procedures, Pressure, Distribution, Velocity, Viscosity, Cooling, Containers, Measurement, Heat transfer, Thermodynamics, Experimental data, Gas cylinders, Axially symmetric flow, Gases.

This research is concerned with the study of turbulent boundary layers in heated air flow in diffusers of circular cross-section with cone angles of 8 degrees and 4 minutes and 12 degrees. The axisymmetrical diffuser makes it possible to eliminate the effect on calculations of the local resistance coefficient and of other flow characteristics of a three-dimensional gas flow which takes place in flat diffusers. The use of experimental data obtained for a flat diffuser hampers the calculation of the resistance coefficient with respect to the integral relation of momenta. In addition, the study of the asisymmetrical flow gradient is of great practical interest. (Author)

AD-402 427 Div. 9
(TISTA/GEC) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
REFLECTION OF SUDDEN CHANGES IN DENSITY FROM THE AXIS OF SYMMETRY,
by D. A. Mel'nikov. 29 Mar 63, 14p. incl. illus. tables (Trans. no. FTD-TT-62-1785 from Russian Periodical, Izvestiya. Otdeleniye Tekhnicheskikh Nauk. Mekanika i Mashinostroyeniye, No. 3, pp. 24-30, 1962)
Unclassified report

DESCRIPTORS: *Axially symmetric flow, Pressure, Condensation, Gas flow, Jet mixing flow, Supersonic flow.

The flow of a supersonic axially symmetrical stream from a nozzle, with pressure in the stream greater or less than the pressure in the surrounding medium, is accompanied by the formation of jumps of condensation which are reflected from the axis of symmetry. The existing methods enable one to compute the flow in such stream, with the exception of the area of the reflection of the jumps in condensation from the axis. The problem is stated with its solution obtained for the flow of a gas in the region of the reflection of an incident jump in condensation from the axis of symmetry and the formation of a central jump in condensation converting a supersonic flow into a subsonic one. The accepted system of flow was confirmed by experiment. There is shown the possibility of reflecting an incident jump in condensation from the axis of symmetry without the formation of a subsonic flow. (Author)

AD-402 455 Div. 9
(TISTM/CCH) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
LAMINAR BOUNDARY LAYER ON A POROUS PLATE WITH CHEMICAL REACTIONS AT THE SURFACE,
by V. S. Avduyevskiy and Ye. I. Obroskova.
26 Mar 63, 20p. incl. illus. 3 refs. (Trans. no. FTD-TT-63-307 from Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, Mekhanika i Mashinostroyeniye, No. 5, pp. 3-12, 1962)
Unclassified report

DESCRIPTORS: *Laminar boundary layer, *Metal plates, Surfaces, Chemical reactions, Porosity.

AD-402 460 Div. 9, 25
(TISTE/JWS) OTS price $4.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
JOURNAL OF ENGINEERING (SELECTED ARTICLES).
29 Mar 63, 43p. incl. illus. tables, 43 refs. (Trans. no. FTD-TT-62-1694 from Inzhenernyy Zhurnal, 2:1, pp. 79-86, 163-170, 175-181, 1962)
Unclassified report

DESCRIPTORS: *Turbulent boundary layer, *Ionization, *Recombination reactions, *Delta wings, *Aerodynamic characteristics, Periodicals, Pressure, Supersonic characteristics, Control surfaces, Flaps, Ailerons, Porous materials, Air.

AD-402 462 Div. 9
(TISTP/RD) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
SOLVING THE BOUNDARY LAYER PROBLEM,
by V. Ya. Shkadov. 3 Apr 63, 7p. 6 refs. (Trans. no. FTD-TT-63-283 from Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, Mekhanika i Mashinostroyeniye, No. 3, pp. 173-175, 1962)
Unclassified report

DESCRIPTORS: *Boundary layer, *Laminar boundary layer, Partial differential equations, Hydrodynamics, Series, Mathematicle analysis, Fluid flow.

AD-402 471 Div. 9
(TISTA/GEC) OTS price $3.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
NEWS OF THE INSTITUTES OF HIGHER LEARNING: AERONAUTICAL ENGINEERING (SELECTED ARTICLES).
19 Mar 63, 30p. incl. illus. table, refs. (Trans. no. FTD-TT-63-159 from Izvestiya VUZov, Aviatsionnaya Tekhnika, No. 2, pp. 102-112, 159-167, 1962)
Unclassified report

DESCRIPTORS: *Turbine blades, *Gas flow, Aeronautics, Universities, Gas ionization, Dissociation, Friction, Mathematical analysis, Chemical equilibrium, Aerodynamic characteristics, Supersonic characteristics, Pipes.

Contents:
Investigation of the Working Cascades of Turbines at Supersonic Velocities
An Approximation Method for Calculating Steady-State Uniform Gas Flow in a Tube with Equilibrium Dissociation and Ionization, Tking into Account Resistance

10. FUELS AND COMBUSTION

AD-401 131 Div. 10, 22
(TISTM/AW) OTS price $9.60

Aeronutronic, Newport Beach, Calif.
STUDY OF DETONATION BEHAVIOR OF SOLID PROPELLANTS.
Final technical rept.,
by M. H. Boyer, D. A. Schermerhorn, and H. Uyehara. 30 Mar 63, 115p. incl. illus. tables, 34 refs. (Publication no. U-2059)
(Contract NOw 62-0503-c)
Unclassified report

DESCRIPTORS: *Solid rocket propellants, *Detonations, Partial differential equations, Equations of state, Propellant grains, Heat of reaction, Chemical reactions, High-explosive ammunition, Models (Simulations), Theory, Mathematical analysis, TNT.

This program on the detonation behavior of propellants is directed toward the development of mathematical techniques by which such behavior can be determined solely from basic hydrodynamic principles and properties of the material. Particular interest is in the prediction of (1) initiation behavior, and (2) energy yield and the stability of detonation, as a function of type of initiation, material parameters and geometry. The approach which has been adopted involves representation of the detonation process in terms of a set of basic equations consisting of the Navier-Stokes conservation equations, the appropriate equations of state, and the rate equations which describe the release of chemical energy. This system of equations is integrated numerically in time and space making use of electronic computer techniques to obtain the history of any defined initial disturbance. Computation of such histories for various configurations and initial conditions will define detonation behavior. (Author)

AD-401 219 Div. 10
(TISTM/AW) OTS price $3.60

Stanford Research Inst., Menlo Park, Calif.
SOLID PROPELLANT MECHANICAL PROPERTIES INVESTIGATIONS.
Quarterly progress rept. no. 3, 1 Dec 62-28 Feb 63,
by Norman Fishman and James A. Rinde. 25 Mar 63, 26p. incl. illus. table (Rept. no. 9)
(Contract AF 04(611)8388)
Unclassified report

DESCRIPTORS: *Solid rocket propellants, Failure (Mechanics), Stresses, Deformation, Dilatometers, Surface properties, Microstructure, Creep, Mechanical properties.

Mechanical properties of propellants AFBA-1 and AEBA-15 were determined. Volume-change data are being obtained by tests in the dilatometer. All work has been with desiccated specimens tested under dry conditions. Dilatometric tests under conditions of constant load verified the thesis that the linear strain-time portion of the creep curve represents a region where dewetting is the process which controls the creep rate. In this region, the volume was found to increase linearly with time. Constant strain tests in the dilatometer at 100 F showed that little or no volume change occurred after the selected value of constant strain was reached. Further, it was found that the physical state of a propellant was not dependent solely on strain but was also a function of path. When comparable extension rates under constant load and constant strain rate conditions were used to extend the specimens to selected values of constant strain, it was found that different volume changes resulted, the higher volume change being associated with extension under constant load. Volume change measurements during constant strain-rate tests at 100 F showed that the volume change at large deformations increased with the strain rate, and further, that the minimum value of Poisson's ratio at large deformations decreased as the strain rate increased. (Author)

AD-401 316 Div. 10
(TISTM/SJR) OTS price $1.10

Aerospace Information Div., Washington, D. C.
HYDROGENERATED COAL TAR PRODUCTS AS POSSIBLE CONSTITUENTS OF T-5 FUEL.
22 Mar 63, 4p. incl. table, 4 refs. (AID rept. no. P-63-39)
Unclassified report

DESCRIPTORS: *Petroleum industry, *Jet engine fuels, Distillation, Hydrogeneration, Catalysts, Oxides, Aluminum compounds, Molybdenum compounds, Sulfides, Nickel compounds, Tungsten compounds, Iron compounds, Processing, Production.

Scattered evidence can be found of Soviet interest in the hydrogeneration of coal tar, a possible constituent of T-5. This is particularly true of Cheremkhovo coal tar. It is stated in the articles discussed that considerable amounts of coal tar are available for processing in Eastern Siberia and are now being used in part in the production of high-quality motor fuels by hydrogeneration. The articles contain a proposal for more effective hydrogeneration flowsheets that would provide for the production of fuels and some chemicals (semiproducts) in directed processes. (Author)

AD-401 686 Div. 10
(TISTP/FEM) OTS price $2.60

Naval Ordnance Lab., White Oak, Md.
CALIBRATION FOR THE GAP TEST WITH A PENTOLITE DONOR,
by I. Jaffe, G. Roberson, and J. Toscano.
29 Jan 63, 17p. incl. illus. tables, 7 refs.
(Rept. no. NOLTR 63-19)
Unclassified report

DESCRIPTORS: *Propellants, Tetryl, Calibration, Pentolite, Explosive materials, Hazards, Pressure, Explosions, Attenuation, Shock waves, Velocity, Differential equations, Sensitivity.

A second calibration of the gap test was made with a pentolite donor replacing the tetryl donor of the standardized test. The calibration consisted of measuring the attenuation of the shock velocity in a Plexiglas rod, and calculating the corresponding shock pressure as a function of gap distance. (Author)

AD-401 768 Div. 10
(TISTM/SJR) OTS price $1.10

Aerospace Information Div., Washington, D. C.
PROPERTIES OF HORIZON IV ANASTASIYEVSKAYA CRUDE, A POSSIBLE SOURCE OF T-5 FUEL. STUDY AND COMMENT.
Work assignment no. 28,
by V. T. Sklyar, G. V. Sabirova and others.
28 Mar 63, 2p. (AID rept. no. P-63-44)
Unclassified report

DESCRIPTORS: *Petroleum industry, Jet engine fuels, Refrigerants, Processing.

AD-401 797 Div. 10
(TISTM/EJH) OTS price $2.60

Bell Aerosystems Co., Buffalo, N. Y.
THIXOTROPIC PROPELLANTS AND UNIT OPERATIONS,
by L. D. Nasiak, Thomas M. Myszkiewicz, and Mathew Sobieniak. Apr 63, 15p. incl. illus. table (Rept. no. BLR 62-24 (C), Rev. A)
(Contract AF 33(657)8555)
Unclassified report

DESCRIPTORS: *Thixotropic rocket propellants, *Liquid rocket propellants, *Manufacturing methods, *Organic compounds, Gels, Additives, Particle size, Carbon black, Silicon compounds, Dioxides, Compatibility, Nitrogen compounds, Tetroxides, Viscosity, Rocket propellants.

An experimental program was conducted to determine the feasibility of forming lyophilic sols, which would exhibit thixotropic properties, using certain selected high-energy gelling agents with 50/50 fuel blend, hydrazine, UDMH, and N2O4. Compatibility tests were performed between the various gelling agents and propellants, followed by attempts to form thixotropic gels with suitable candidate materials. The measurement of physical properties was undertaken on the thixotropes which were formed. (Author)

AD-401 798 Div. 10
(TISTM/AW) OTS price $2.60

Bell Aerosystems Co., Buffalo, N. Y.
ANALYTICAL CHEMISTRY,
by Peter Yin, William L. Clark, and John C. Tynan. Apr 63, 15p. incl. illus. tables, 1 ref. (Rept. no. BLR 62-20 (C), Rev. A)
(Contract AF 33(657)8555)
Unclassified report

DESCRIPTORS: *Rocket propellants, Infrared spectroscopy, Chromatographic analysis, Nitrogen compounds, Oxides, Dacron, Solid rocket propellants, Compatibility, Halocarbon plastics, Laboratory equipment, Instrumentation, Standards, Chemical analysis.

Research and development were directed toward the development and improvement of standards or standard procedures for the analyses of rocket propellants. Instrumentation techniques were stressed as a means of obtaining fast, accurate and reliable analyses. (Author)

11. GROUND TRANSPORTATION EQUIPMENT

AD-402 257 Div. 11, 30
(TISTE/JWS) OTS price $8.10

Army Engineer Waterways Experiment Station, Vicksburg, Miss.
PROJECT OTTER (OVERLAND TRAIN TERRAIN EVALUATION RESEARCH),
Pretest report,
by John H. Shamburger and Charles R. Kolb. Dec 61. 1v. incl. illus. tables (Technical rept. no. 3-588; rept. no. 1) Unclassified report

Original contains color plates; all DDC reproductions will be in black and white. Original may be seen in DDC Hq.

DESCRIPTORS: *Cargo vehicles, *Amphibious vehicles, *Tracked vehicles, Infrared images, Radar, Mapping, Maps, Geography, Aerial photography, Deserts, Terrain, Desert tests.

Performance in desert areas of the Overland Train, a logistical cargo carrier, is to be tested in 1962 at the Yuma Test Station by the U. S. Army Transportation Research Command (TRECOM). To realistically evaluate test results, TRECOM needs to know the representativeness of the terrain over which the Overland Train is tested compared with world desert terrain conditions. Projects concerned with terrain analysis and evaluation have been conducted at WES for several years and a classification system, based on plan-profile, slope occurrence, slope, relief, soil type, soil consistency, rock type, and vegetation, and a technique for mapping terrain factors have been developed. Many world deserts, including the desert at Yuma, have been mapped. Fourteen test courses were tentatively selected at the Yuma Test Station after a comprehensive office study of the terrain factor maps of the area. A major field investigation was conducted of the test courses at Yuma which included: (a) surveying and delimiting test courses, (b) gathering terrain factor data, and (c) obtaining aerial imagery. Terrain types classified along nine of the test courses are compared to terrain of world deserts. (Author)

AD-402 302 Div. 11
(TISTW/JEA) OTS price $4.60

Army Transportation Board, Fort Eustis, Va.
TIRES, OVERSIZE, SPECIAL AND DESERT. PHASE III: SUBARCTIC EVALUATION.
Evaluation rept.
Mar 63, 41p. incl. illus. tables (Rept. no. TCB-61-123-EV, phase 3)
(Proj. 7D-3118-01)
Unclassified report

DESCRIPTORS: *Tires, *Cargo vehicles, Transportation, Photographs, Polar regions, Vehicles, Vehicle wheels, Mobile, Maneuverability.

The subarctic evaluation of three types of tires under subarctic conditions: standard military (non-directional cross-country NDCC and non-directional mud and snow NDMS tires, Firestone Duplex tires, and Goodyear terra-tires are presented. Seven different vehicle-tire combinations, military and commercial, were evaluated or observed. Additional evaluations with other classes of vehicles are recommended. (Author)

12. GUIDED MISSILES

AD-401 189 Div. 12, 25, 27, 10
(TISTM/PCR) OTS price $3.60

Stanford Research Inst., Menlo Park, Calif.
VISCOELASTIC PROPERTIES OF SOLID PROPELLANTS AND PROPELLANT BINDERS.
Quarterly technical summary rept. no. 6, 1 Oct-31 Dec 62,

by Thor L. Smith, Leon E. Hiam, and James R. Smith. 31 Jan 63, 26p. incl. illus. 7 refs. (Contract NOw 61-1057-d)
Unclassified report

DESCRIPTORS: *Solid rocket propellants, *Binders, Shear stresses, Isocyanate plastics, Tensile properties, Temperature, Mathematical analysis, Equations, Calibration, Pressure, Time, Compressive properties, Viscoelasticity.

A discussion of the basic transducer equations for the dynamic shear tester and progress being made in improving certain electronic and mechanical components of the apparatus is presented. A quantitative discussion is given of a dynamic apparatus for studying bulk compressibility and of progress being made in determining the temperature dependence of the static bulk modulus of the polyurethane propellant AEBA-10. Tensile data on AEBA-10 have been represented by an analytical equation from which the complex shear modulus was computed by use of approximate interconversion methods. (Author)

AD-401 199 Div. 12, 15
(TISTP/TL) OTS price $2.60

Aerospace Corp., Los Angeles, Calif.
DERIVATION OF APPROXIMATING POLYNOMIALS FOR FUNCTION 1-EV,
by S. Herbert Lewis. 21 Jan 63, 25p. incl. illus. tables, 2 refs. (Rept. no. TDR-169(3305)TN-2)
(Contract AF 04(695)169)
(SSD-TDR-63-15) Unclassified report

DESCRIPTORS: *Polynomials, *Functions, *Guided missiles, *Computers, *Simulation, *Taylor's series, *Guidance, Series, Numerical analysis, Differential equations, Equations, Tables.

Formulas and tables are developed for compressing the power series representation of a function to obtain minimal order approximating polynomials maintaining specified accuracy throughout an assigned range of arguments. Coefficients for polynomials approximating the function 1-ev are derived and scaled for use in a fixed point computer. (Author)

AD-401 239 Div. 12, 27
(TISTP/PCR) OTS price $1.60

Rocketdyne, Canoga Park, Calif.
ATLAS ENGINE SYSTEM COUNTDOWN RELIABILITY REPORT.
10 Apr 63, 20p. (Rept. no. RDR 3181-15D)
(Contract AF 04(694)328)
Unclassified report

DESCRIPTORS: *Rocket motors (Liquid propellant), Strategic weapons, Rocket motor clusters, Booster rockets, Tests, Reliability, Propulsion, Guided missiles (Surface-to-surface).

This report contains data applicable to the Atlas Engine System Countdown Reliability in accordance with contractual requirement. Two listings, booster and sustainer engines, arranged in chronological order, detail all countdown tests performed during the stated period. The tests have evaluations of Exclusion, Success or Failure and include descriptive statements of test results where pertinent. An explanation of the headings, codes and abbreviations are included for clarification of terminology. (Author)

AD-401 408 Div. 12, 25
(TISTA/LSK) OTS price $1.10

System Development Corp., Santa Monica, Calif.
RELEASE OF MSAP SIMULATION SUBSYSTEM MILESTONE 8,
by R. E. Busch. 18 Mar 63. 3p. (Rept. no. TM-(L)-734/038/00)
(Contract AF 19(628)1648)
Unclassified report

DESCRIPTORS: *Satellites (Artificial), *Programming (Computers), Guided missile tracking systems, Orbital trajectories, Data processing systems, Simulation, Radar tracking, Flight simulators.

Contents:
Simulated Data Generation (SIPSA)-1604
Interface Simulation (SIMSTN)-160-A
Data Reduction Area (DROPSA)-1604

AD-401 409 Div. 12, 30
(TISTE/OHD) OTS price $1.60

System Development Corp., Santa Monica, Calif.
INDIAN OCEAN STATION BUFFER. MILESTONE 3,
by D. A. Biggar. 7 Mar 63, 9p. incl. illus.
(Rept. no. TM(L)-1079)
(Contract AF 19(628)1648)
Unclassified report

DESCRIPTORS: *Programming (Computers), *Satellite networks, *Data processing systems, Space flight, Teletype systems, Punched tape, Tracking, Control systems, Telemetering data.

The report describes program requirements for the Indian Ocean Station Buffer, a 160-A program system designed for use at the Satellite Control Facility. Gives a general description of the programs, their interfaces, and scheduling. (Author)

AD-401 411 Div. 12, 30
(TISTP/TL) OTS price $1.10

System Development Corp., Santa Monica, Calif.
SCF COMPUTER PROGRAM SYSTEMS MANUAL GENERAL PURPOSE SATELLITE PROGRAMS ENTER RUN IDENTIFICATION ON RESET TAPE (RUNNUM).
by H. W. Houghton. 22 Jan 63, 2p. (Rept. no. TM-(L)-721/016/00)
(Contract AF 19(628)1648)
Unclassified report

DESCRIPTORS: *Programming (Computers), *Satellites (Artificial), Magnetic tape, Quality control, Reliability, Identification.

RUNNUM places an alpha-numeric run identification of up to 8 characters from a function card or calling sequence into the Reference Pool and onto the Reset Tape for a specified vehicle. (Author)

AD-401 413 Div. 12
(TISTW/JEA) OTS price $3.60

Boeing Co., Seattle, Wash.
GROUND TEST MISSILE REQUIREMENTS,
by R. S. Cunningham. 1963, 37p. incl. illus. tables (Rept. no. D2-30118)
(Contract AF 04(694)266)
Unclassified report

DESCRIPTORS: *Guided missiles (Surface-to-surface), *Checkout equipment, Tests, Operation, Instrumentation, Scheduling, Configuration.

The purpose of this presentation is to state the ground test missile requirements for support of the WS-133B Program. These requirements include GTM quantities, configurations, utilization, schedules, and instrumentation. Ground test missiles support test, assembly and checkout operations at the Atlantic Missile Range (AMR), Vandenberg Air Force Base (VAFB), USAF Plant 77, and Seattle are given. It is desirable to support the test objectives at AMR, VAFB and Seattle with a minimum number of ground test missiles. The test programs are described only in general terms since it is the purpose of the test program plans and the detailed test requirements specifications for such major program to provide such specific information. The GTM quantities were derived from an analysis of the test planning and program scheduling accomplished to date. In the event that GTM requirements for operational bases are finalized, these will be added at a subsequent revision. (Author)

AD-401 441 Div. 12, 30, 18
(TISTA/VGW) OTS price $1.60

System Development Corp., Santa Monica, Calif.
CHANGES TO FUNCTION TIME FOR PROGRAM 162,
by T. D. Court. 4 Mar 63, 9p. (Technical memo. TM-1067/000/00)
(Contract AF 19(628)1648)
Unclassified report

DESCRIPTORS: *Orbital trajectories, Tracking, Data processing systems, Punched tape, Programming (Computers).

The routines using the Timer information have been limited in length to 1500 Command events. Further requirements indicate that the number of events may extend to 6000 and there is no indication that this number is an absolute upper limit. The programs were not able to handle this many events and consequently have been modified. It is the intention of this document to describe the method by which these programs have been modified without jeopardizing their operational features. In the past this problem was resolved by increasing the buffer lengths in the computer programs for the increased number of command events.. This method of modification is no longer feasible. The data package preparation program (*SPDPT) has been changed to give the timer commands a new format on the data package tape. Rather than having 1500 BCD commands followed by 1500 BCD decimal times, there are just 1500 card image records. Each record has a command and its associated on or off time. (Author)

AD-401 442 Div. 12, 30, 18
(TISTA/VGW) OTS price $1.10

System Development Corp., Santa Monica, Calif.
MODIFICATION OF SVPAS AND SNPAS FOR SPACETRACK DATA,
by P. Cooley and D. Harris. 20 Mar 63, 7p.
(Technical memo. no. TM-(L)-1119/000/00)
(Contract AF 19(628)1648)
Unclassified report

DESCRIPTORS: *Computers, *Orbital trajectories, Data processing systems, Punched tape, Radar stations, Tracking, Input-output devices, Programming (Computers).

The Vandenburg Tracking Station and the New Boston Tracking Station now use as input the Local Tracking paper tape output by SPACETRACK in lieu of a binary transfer tape from the PREPASS program. The purpose of this is to test the thesis that SPADATS Look Angle data can be used to support a pass at a tracking station for Program 417 vehicles. (Author)

AD-401 443 Div. 12, 30, 18
(TISTA/VGW) OTS price $3.60

System Development Corp., Santa Monica, Calif.
GENERAL PURPOSE SATELLITE COMPUTER PROGRAM DESCRIPTIONS MILESTONE 11. 5-LEVEL PAPER TAPE DATA READ (PT),
by C. J. Zubris. 21 Feb 63, 34p. incl. illus.
(Technical memo. no. TM-714/031/00)
(Contract AF 19(628)1648)
Unclassified report

DESCRIPTORS: *Satellite networks, *Programming (Computers), *Orbital trajectories, Data storage systems, Data processing systems, Punched tape, Input-ouput devices.

The 5-level paper tape data read (PT) will read and store data from six different types of 5-level paper tape. A BCD list tape of data is optional. (Author)

AD-401 464 Div. 12
(TISTP/PCR) OTS price $4.60

Boeing Co., Seattle, Wash.
BSD EXHIBIT 62-71 OPERATIONAL FACILITIES REQUIREMENTS FOR MINUTEMAN WS-133B.
Rev. 27 Mar 63, 48p. incl. illus. tables.
Unclassified report

DESCRIPTORS: *Launching sites, Strategic weapons, Documentation, Ground support equipment, Site selection, Launching, Survival, Vulnerability, Maintenance, Communication systems, Power supplies, Shielding, Guided missile launchers, Hardening, Guided missiles (Surface-to-surface).

Operational facilities requirements for WS-133B are established. Requirements for WS-133B facilities comprising an operational wing include: (1) launch control facility (LCF), (2) launch facility (LF), (3) strategic missile support base (SMSB), and (4) connecting roads and utility services. These requirements are predicted upon the use of an existing Air Force base for administration and logistical support. It is assumed that industrial facilities and quarters for administrative and support personnel will be available on the existing base. (Author)

AD-401 690 Div. 12, 30, 4, 10
(TISTM/PCR) OTS price $7.60

Aerojet-General Corp., Azusa, Calif.
PROTOTYPE PROPELLANT-TESTING SYSTEM. PHASE III - DESIGN AND CONSTRUCTION OF CONTAMINANT-INTRODUCTION SYSTEM.
Final rept., 13 July 62-31 Jan 63,
by R. C. Adrian, H. C. Edgington, and F.E.Miller. Apr 63, 1v. incl. illus. tables, 3 refs. (Rept. no. 2486)
(Contract AF 04(611)8196)
RTD-TDR-63-1024) Unclassified report

DESCRIPTORS: *Liquid rocket propellants, Solids, Liquids, Gases, Vapors, Cryogenics, Instrumentation, Tests, Test equipment, Calibration, Photographs, Pictures, Construction, Contamination.

A prototype contaminant-introduction system was designed and fabricated for the addition of solid, liquid, and gaseous contaminants to storable or cryogenic propellants maintained under diverse conditions. Five separate units for the addition of solids, liquids, gases, cryogenic liquids, and vaporized liquids were constructed and tested to demonstrate their capabilities for adding small amounts of impurities in the range from 10 to 5000 ppm at accuracies of 6 to 20%. (Author)

Division 12 - GUIDED MISSILES

AD-401 727 Div. 12
(TISTA/VGW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
MAIN GOALS OF THE HISTORICAL FLIGHT,
by B. Semenov. 8 Mar 63, 5p. (Trans. no. FTD-TT-63-24 from Russian Periodical, Sovetskaya Rossiya, No. 192 (1872), 2p. 15 Aug 62)
Unclassified report

DESCRIPTORS: *Space flight, *Space capsules, Control systems, Orbital trajectories, Attitude control systems.

AD-401 738 Div. 12
(TISTP/FR) OTS price $14.00

Foreign Tech Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
DYNAMIC AND FLUCTUATION ERRORS IN GUIDED VEHICLES (Dinamicheskiye T Flyuktuatsionnyye Oshibki Upravlyayemykh Ob''Yektov),
by A. N. Shchukin. 26 Mar 63, 201p. incl. illus. tables, 13 refs. (Trans. no. FTD-TT-62-1087 from Izdatel'stvo ''Sovetskoye Radio'', pp. 1-214, 1961 - Moskva)
Unclassified report

DESCRIPTORS: *Guided missiles, *Guidance, Control systems, Circuits, Feedback, Noise (Radio), Errors, Linear systems, Integral transforms, Differential equations.

Contents:
Operational method for solution of linear differential equations
The spectral method of analyzing processes in linear systems
Circuits with feedback
The guided missile as a loop with feedback
Form of control functions and dynamic errors for various control methods
Errors due to discontinuous information
Fluctuation noise and its effect upon errors in determining coordinates of an object
Fluctuation errors in bearing determinination
Fluctuation-noise errors in ranging
Probable values of coordinates, velocities, and accelerations
Errors due to signal fluctuations
Equivalent control-loop bandwidth

AD-401 883 Div. 12, 27
(TISTA/FRL) OTS price $2.60

Rocketdyne, Canoga Park, Calif.
ATLAS.
Component reliability monthly rept. for Mar 63, by W. L. Stewart. 12 Apr 63, 26p. incl. tables. (Rept. no. RDR 3181-40D)
(Contract AF 04(694)328)
Unclassified report

DESCRIPTORS: *Guided missiles (Surface-to-surface), *Rocket motors (Liquid propellant), Tests, Turbines, Pumps, Combustion chambers, Fuel injectors, Gas generator systems, Vernier rocket motors, Valves, Hydraulic systems, Control systems, Pneumatic systems, Exhaust pipes, Electrical equipment, Failure (Mechanics), Data, Reliability.

Component reliability information on the MA-3 propulsion system collected during all stages of manufacturing, assembly, and testing is presented. All failures occurring on hardware of production engine systems are considered and are reported. Running time for five primary components are presented including a number of exposures for the remaining 13 primary components, a number of critical and non-critical failures, and a number of different units in use during each reporting period. The failure listing identifies the failed component and the failure report number. (Author)

AD-401 885 Div. 12, 29
(TISTP/PCR) OTS price $9.60

Rocketdyne, Canoga Park, Calif.
EVALUATION OF HAZARDS AND PRELIMINARY DESIGN OF PROTECTIVE EQUIPMENT FOR HANDLING ATLAS IGNITION DEVICES,
by T. R. Spring and R. B. Gordon. 11 Apr 63, 105p. incl. illus. tables, 4 refs. (Rept. no. R-5064)
(Contract AF 04(694)328)
Unclassified report

DESCRIPTORS: *Rocket igniters, *Guided missile personnel, *Protective clothing, Guided missiles (Surface-to-surface), Strategic weapons, Rocket motors (Liquid propellant), Design, Tests, Fire protective clothing, Gloves, Protective coverings, Hypergolic rocket propellants, Solid rocket propellants, Silos, Helmets, Textiles, Handling, Safety devices, Hazards.

AD-401 901 Div. 12
(TISTP/PCR) OTS price $1.10

Harry Diamond Labs., Washington, D. C.
EFFECTIVENESS STUDIES OF MISSILE SYSTEMS AGAINST GROUND TARGET,
by Don Mittleman. 25 June 58, 6p. (Rept. no. TM 01.21-58-1(Part II,a.)
Unclassified report

DESCRIPTORS: *Guided missiles (Surface-to-surface), Mathematical analysis, Targets, Damage, Probability, Equations, Integral equations, Integral transforms, Guided missiles, Guided missile warheads, Effectiveness.

The effectiveness of a warhead having a spherical damage pattern is evaluated against a point target on the ground. Many of the formulae previously obtained simplify to such extent that a separate treatment seems justified. (Author)

AD-401 926 Div. 12, 26
(TISTP/PCR) OTS price $7.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
GEMINI PROGRAM PLAN.
1 Apr 63, 1v. incl. illus. (Rept. no. LMSC-A306070)
(Contract AF 04(695)129)
Unclassified report

DESCRIPTORS: *Manned spacecraft, *Rendezvous spacecraft, Spacecraft docking, Tests, Ground support equipment, Scientific organizations, Military organizations, Engineering, Industrial plants, Costs, Design, Booster rockets, Human engineering, Reliability, Quality control, Launching sites, Scheduling, Research program administration, Production.

The Gemini Program has been established by the National Aeronautics and Space Administration (NASA) for the purpose of investigating, testing, and evaluating techniques for the rendezvous, docking, and joint maneuvering of vehicles in space. Each demonstration will involve the launching, operation, and orbital rendezvous of an unmanned Agena Target Vehicle and a two-man, manned, Gemini Spacecraft. The Agena Target Vehicle and the Spacecraft will be launched from Cape Canaveral, Florida, over the

Atlantic Missile Range (AMR) into orbits about the earth. The launching of the Agena Target Vehicle will occur at an azimuth angle of 83.8 degrees from true north, at an angle of inclination of 29 degrees from the equator. The Spacecraft will be launched approximately 24 hours later. The desired rendezvous orbit will be circular with an altitude of 161 nautical miles. The purpose of this plan is to describe the manner in which Lockheed Missiles and Space Company intends to satisfy program obligations. (Author)

AD-401 928 Div. 12, 27
(TISTA/GEC) OTS price $6.60

Rocketdyne, Canoga Park, Calif.
ATLAS MA-3 SUSTAINER AND BOOSTER VIBRATION TEST PROGRAM.
10 Apr 63, 55p. incl. illus. tables (Rept. no. R-5125)
(Contract AF 04(694)328)
Unclassified report

DESCRIPTORS: *Rocket motors (Liquid propellant), Specifications, Fuel systems, Fuel hose, Military requirements, Test methods Booster rockets, Vibration.

This specification includes the design criteria and test program to be conducted by Rocketdyne for the vibration test of two Atlas MA-3 rocket engines. The primary purpose of these tests is to determine whether any marginal design conditions exist on fluid lines and their supports. (Author)

AD-402 078 Div. 12, 6
(TISTP/PCR) OTS price $9.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
ARPA SATELLITE FENCE SERIES.
Technical summary rept. no. 3, 1 July 59-1 July 60,
by L. G. deBey. July 60, 115p. incl. illus. tables (Memo. rept. no. 1287; Rept. no. 16)
Unclassified report

DESCRIPTORS: *Satellites (Artificial), *Tracking, Radar tracking, Track-while-scan radar, Radar antennas, Costs, Orbital trajectories, Mathematical analysis, Radar echo areas.

A summary of the significant progress and activity is presented on the development of DOPLOC, a dark satellite tracking system, over the period from 1 July 1959 to 1 July 1960. A resume is given of the program administration and project assignment chronology. A description of the Scanning DOPLOC System, including cost estimates for various combinations of antenna types is presented. An analysis of the proposals submitted by eleven contractors and the basis for the choice of two acceptable proposals is given. The activity in the development of mathematical processes for determining the orbital parameters from DOPLOC data and its successful application to measured data is discussed. It is noteworthy that twenty completely independent, single-pass, satellite orbital solutions have been obtained. Studies supporting the development of the Scanning DOPLOC System are discussed briefly. Experimental use of the field station facilities for the tracking of non-radiating satellites is described and sample data are shown to illustrate the system performance. A compilation of the satellites tracked by reflection summarizes pertinent tracking data including signal duration, signal strength and effective reflection cross section (Author)

AD-402 079 Div. 12, 9
(TISTA/GEC) OTS price $5.60

Aerospace Corp., Los Angeles, Calif.
APPROXIMATE SOLUTIONS OF THE LATERAL MOTION OF RE-ENTRY VEHICLES DURING CONSTANT ALTITUDE GLIDE,
by H. E. Wang. 25 Feb 63, 50p. incl. illus. tables, 12 refs. (Rept. no. TDR-169(3560-10)TN-1)
(Contract AF 04(695)169)
(SSD TDR 63-60) Unclassified report

DESCRIPTORS: *Reentry vehicles, Mathematical analysis, Theory, Equations, Atmosphere entry, Lift, Drag, Gliders, Terminal guidance, Maneuverability, Yaw.

Approximate analytic solutions were obtained to the lateral motion of re-entry vehicles during constant altitude glide. The approach taken was to first treat the flat earth case and then include the spherical earth correction. Simple expressions were obtained for the turn angle, lateral range angle and the down range angle. A comparison with exact numerical solutions showed that the approximate solutions were sufficiently accurate for preliminary design purposes. The approximate solutions, although simple, contained all the characteristics of the glide mode in question. The results showed that the lateral range exhibited a maximum for a given lift-to-drag ratio (L/D) and initial velocity for the spherical earth case. In the flat earth case, the maximum existed for suborbital and orbital initial velocities and ceased to exist above a certain initial velocity depending on L/D. The down range also exhibited a maximum for a given L/D and initial velocity provided that the initial velocity is suborbital. The spherical earth correction on the lateral and down range was shown to be small for low vehicle weight/drag coefficient x reference area x atmospheric density ($W/(C_D A \rho)$), L/D and initial velocities, and becomes significant when these parameters are high. (Author)

AD-402 114 Div. 12
(TISTA/GEC) OTS price $9.60

Florence U. (Italy).
ELECTROMAGNETIC CONTROL OF THE ATTITUDE OF SPACE VEHICLES.
Technical rept.,
by P. Bruscaglioni and A. Consortini. Dec 62, 112p. incl. illus. tables, 29 refs.
(Contract AF 61(052)536)
(AFCRL 63-83) Unclassified report

DESCRIPTORS: *Spacecraft, *Attitude control systems, Satellites (Artificial), Theory, Polarization, Satellite antennas, Guided missile antennas, Torque, Moments, Electromagnetic waves.

A theoretical investigation was made of the possibility of applying the properties of elliptically polarized waves for the attitude control of space vehicles. Three different ways of applying electromagnetic radiation were discussed. One employs an antenna placed on a space vehicle, and radiating with circular polarization. A reaction torque turned out to be applied to the vehicle. The second one makes use of the torque experienced by a receiving antenna, placed on the vehicle, when a ground station radiated towards the vehicle. The third one is based on the simultaneous and tuned emission of radiation from an antenna located on the vehicle and a ground antenna. A comparison between the torque which can be obtained and the torques necessary

to the control of the attitude of a space vehicle in actual situations showed that the first procedure can have practical importance, while the torques obtained by means of the second and third procedures seem to be too weak. (Author)

AD-402 208 Div. 12, 30
(TISTW/JEA) OTS price $2.60

System Development Corp., Santa Monica, Calif.
NEW 1604 COMPUTER PROGRAMS MILESTONE V INPUT TRACKING DATA (STAPIN),
by Nancy Speer. 22 Jan 63, 23p. incl. illus.
(Technical memo. no. TM-(L)-793/003/00)
(Contract AF 19(628)1648)
Unclassified report

DESCRIPTORS: *Space surveillance systems, *Programming (Computers), Satellites (Artificial), Input-output devices, Selection, Reading machines, Errors, Data processing systems, Programming languages, Tracking, Satellite networks, Magnetic tape.

STAPIN (Input Tracking Data) is a closed subroutine that reads all tracking data, formats and stores them in the locations specified by the user program, and, if requested, provides a BCD listing of the data points for off-line printing. Also, STAPIN replaces the present PT subroutine in the STA program system. (Author)

AD-402 241 Div. 12, 32
(TISTA/VGW) OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
BIBLIOGRAPHY OF REPORTS - 1 JANUARY THROUGH 31 MARCH 1963,
comp. by Barbara H. Peer. 15 Apr 63, 1v. incl. illus. (Rept. no. CSR-169(9990)QBR-3)
(Contract AF 04(695)169)
Unclassified report

DESCRIPTORS: *Bibliographies, Spacecraft, Air Force research, Space flight, Space weapons, Space propulsion, Guided missiles, Detection, Aerodynamic configurations, Aerodynamic characteristics, Index, Reports.

AD-402 245 Div. 12
(TISTA/LSK) OTS price $2.60

RAND Corp., Santa Monica, Calif.
SOVIET ASTRONAUTICS: 1957-1962,
by F. J. Krieger. Apr 63, 16p. incl. illus. tables (Memorandum no. RM-3595-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Astronautics, Orbital trajectories, Interplanetary trajectories, Lunar trajectories, Space capsules, Space probes, Mars probes, Venus probes, Satellites (Artificial), Lunar probes, Tables, Research program administration.

The Soviet aerospace program has been developing in four well defined, although interrelated phases--the earth-orbital, the lunar, the interplanetary, and the ancillary or so-called Cosmos Series--with corresponding increase in technological complexity. All phases are aimed at eventual manned interplanetary travel. The current earth-orbital, or man-in-space, program, having received the greatest emphasis, has perforce been the most successful. The interplanetary phase, despite single probes to Venus and Mars, has been plagued with difficulties in effecting the transfer from a parking orbit to an interplanetary trajectory. (Author)

AD-402 255 Div. 12, 8
(TISTE/JWS) OTS price $6.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
SATELLITE-TO-SATELLITE PROPAGATION EXPERIMENT FEASIBILITY STUDY AND PRELIMINARY DESIGN,
by John D. Meyer. 11 Dec 62, 1v. incl. illus.
(Scientific rept. no. 1)
(Contract AF 19(628)457, Proj. 4603)
(AFCRL 63-4) Unclassified report

DESCRIPTORS: *Ionospheric propagation, *Satellites (Artificial), Attenuation, Distortion, Temperature, Doppler effect, Magneto-optic effect, High frequency, Radio transmitters, Orbital trajectories, Radio receivers, Satellite antennas, Launch vehicles (Aerospace).

The effects of the ionosphere upon radio frequency electromagnetic waves are discussed. Several types of satellite-to-satellite propagation experiments are presented, and the problems of implementation are delineated. The equipment around which the experiment must be designed is described, as are the vehicles available in Program 162. The relative merits of the various vehicles and the basis for the selection of the experimental configuration are discussed. The preliminary design results are shown. (Author)

AD-402 278 Div. 12
(TISTW/JEA) OTS price $26.00

Boeing Co., Seattle, Wash.
ASSEMBLY AND CHECKOUT EQUIPMENT CATALOG.
18 Mar 63, 1v. incl. illus. (Rept. no. D2-11713-2)
(Contract AF 04(647)580)
Unclassified report

DESCRIPTORS: *Guided missiles (Surface-to-surface), *Check-out equipment, *Catalogs, Adapters, Ground support equipment, Specifications, Military requirements, Handling, Radio equipment, Photographic equipment, Power equipment, Power equipment parts.

AD-402 300 Div. 12
(TISTW/JEA) OTS price $11.00

Boeing Co., Seattle, Wash.
THE WING III QPRI SUPPLEMENT FOR WS-133A MINUTEMAN HARDENED AND DISPERSED,
by J. Clerkin. 20 Mar 63, 146p. incl. illus.
(Document no. D2-5859, Vol. II; Addendum no. 3)
Unclassified report

DESCRIPTORS: *Guided missiles (Surface-to-surface), *Launching sites, *Weapon systems, Hydraulic jacks, Guided missile safety, Monitors, Guided missile launchers, Control systems, Ground support equipment, Maintenance, Transportation, Dispersion hardening, Specifications, Checkout equipment, Operation.

The Wing III Supplement should be used with the Wing I QPRI and the Wing II Supplement. This supplement updates the Wing I document with the Wing II Supplement to the Wing III configuration. The major Wing III changes resulted from hardening and extending the survival period of the Launch Facility and the Launch Control Facility. An entirely new structure, the Launch Control Equipment Building, was constructed adjacent to the Capsule. It houses the equipment necessary to sustain the Capsule and the EWO capability for extended periods. Also, a hydraulic pusher was substituted for the gear-case motor. (Author)

AD-402 301 Div. 12
(TISTW/JEA) OTS price $3.60

Boeing Co., Seattle, Wash.
THE WING III QPRI SUPPLEMENT FOR WS-133A MINUTEMAN HARDENED AND DISPERSED,
by J. Clerkin. 20 Mar 63, 38p. incl. illus. tables (Document no. D2-5859, vol. 1, Addendum no. 3)
Unclassified report

DESCRIPTORS: *Guided missiles (Surface-to-surface), *Launching sites, *Weapon systems, Transportation, Dispersion hardening, Specifications, Guided missile launchers, Hydraulic jacks, Control systems, Maintenance, Checkout equipment, Ground support equipment.

AD-402 326 Div. 12
(TISTA/LSK) OTS price $2.60

Aerospace Corp., Los Angeles, Calif.
A MAGNETOHYDRODYNAMIC FLOW ANGLE INDICATOR,
by A. E. Fuhs and O. L. Gibb. 13 Nov 62, 17p. incl. illus. 5 refs. (Rept. no. TDR-169(3153)TN-4)
(Contract AF 04(695)169)
(BSD TDR 62-318) Unclassified report

DESCRIPTORS: *Gas flow, *Attitude indicators, Angle of attack, Re-entry vehicles, Magnetic fields, Plasma sheath, Plasma, Gas ionization, Atmosphere entry, Electrical conductance, Magnetohydrodynamics.

By using the directional sensitivity of the electrical conductivity instrument, it is possible to measure the direction of the flow of a conducting gas. If only one coil set is used, a complex calibration procedure is necessary; however, by using two coil sets, the flow angle becomes a function only of the ratio of two signals. It is shown theoretically, and verified experimentally, that the signal varies as the cosine of the flow angle. The flow angle can be expressed analytically as a function of signal ratio. Calculated and observed signal ratios are in agreement. The precision of measurement is ±(1 deg. + 5%) for flow angles of +45 to -45 degrees. (Author)

AD-402 384 Div. 12
(TISTA/GEC) OTS price $1.00

Behavioral Sciences Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
RELATIVE MOTION IN THE DOCKING PHASE OF ORBITAL RENDEZVOUS.
Final rept., Dec 61-Mar 62 on Human Performance in Advanced Systems,
by Donald D. Mueller. Dec 62, 30p. incl. illus. table, 6 refs.
(Proj. 7184)
(AMRL TDR 62-124) Unclassified report

DESCRIPTORS: *Rendezvous spacecraft, Space flight, Aviation personnel, Equations, Motion, Orbital trajectories, Rocket motors, Manned, Manned spacecraft, Maneuverability, Rocket propulsion, Spacecraft docking.

This report analyzes the relative motion which exists between an interceptor and target vehicle in the final stages of orbital rendezvous. Four distinct types of nearby parking orbits were defined. It was assumed that a man wearing an extra-vehicular suit and a self-maneuvering unit would exit the interceptor and traverse the remaining distance to the target. Both two-impulse transfers and continuous-thrust, line-of-sight transfers were analyzed. It was found that the direction in which the man should aim himself to make a two-impulse transfer depends only on the time he wishes to consume in the rendezvous and does not depend on the distance to be traveled. Comparisons of fuel consumption for the two-impulse technique and the line-of-sight technique were made and an optimum transfer combining both these techniques was suggested. The results of this study indicate that Coriolis forces and tidal effects cannot be neglected even at the relatively short ranges associated with orbital docking. (Author)

AD-402 402 Div. 12
(TISTA/GEC) OTS price $6.60

Land-Air Inc., Point Mugu, Calif.
A PROGRAM TO FIT IZSAK'S ANALYTICAL SOLUTION TO A TRANSIT SATELLITE ORBIT,
by Werner E. Knolle. 4 Mar 63, 61p. incl. tables (Rept. no. 42)
(Contract N-123(61756)19425A)
Unclassified report

DESCRIPTORS: *Equatorial orbit trajectories, *Orbital trajectories, Mathematical analysis, Measurement, Differential equations, Satellites (Artificial), Programming (Computers), Digital computers, Determination.

I. G. Izsak obtained an analytical solution for a satellite orbit by replacing the potential of the earth by Vinti's potential. The solution contains six arbitrary constants of integration. This report is concerned with finding initial values for these six constants and correcting their values to obtain the 'best fit' of the analytical solution to a numerically-integrated ephemeris of a satellite. The differences between corresponding coordinates of the exact orbit and the Vinti-orbit, referred to as 'residuals' or 'perturbations', are obtained in rectangular as well as spherical coordinates. A 24-hour orbit is used for the fitting-procedure and the analytical solution is extended over the next 24 hours to predict an intermediary orbit. (Author)

AD-402 442 Div. 12
(TISTA/GEC) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
AUTOMATIC STATIONS FLY TO THE PLANETS,
by Yuriy Marinin. 29 Mar 63, 6p. (Trans. no. FTD-TT-63-301 from Russian newspaper, Turkmenskaya Iskra, p. 4, 30 Nov 62)
Unclassified report

DESCRIPTORS: *Venus probes, *Mars probes, Space probes, Attitude control systems, Control jets, Instrumentation, Aerial photography, Mapping, Auxiliary power plants, Radio communication systems, Interplanetary trajectories, Design.

AD-402 475 Div. 12
(TISTA/GEC) OTS price $12.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
MAN PENETRATES INTO THE COSMOS (CHEVLOVEK PRONIKAET V KOSMOS),
by M. G. Kroshkin. 27 Mar 63, 162p. incl. illus. (Trans. no. FTD-TT-62-1854 from Voyennoye Izdatel'stvo Ministerstva Oborony Soyuza SSR (Moskva) pp. 1-60, 1962)
Unclassified report

DESCRIPTORS: *Space flight, *Space probes, Manned spacecraft, Space stations, Astronautics, Propaganda, Scientific research.

Manned space flights and the use of rockets and artificial earth satellites for scientific purposes are reported. The basic stages in the history of the space age, the works of K. E. Tsiolkovskiy and the flights of Soviet pilot-astronauts are described. Results of scientific investigations in space and their significance in the general complex of geophysical and astronomical sciences are discussed. Much attention is given to the description of the earth's radiation belts, their discovery and a hypothesis of their origination. Data obtained in investigating the invisible part of the moon and interplanetary media is expounded. The question of whether or not there is life on other stellar worlds and whether communication can be established with intelligent beings of these worlds is considered. The author attempts to look into the future and evaluate what the influence of man's entry into space would be on the progress of science and technology, culture and economics. (Author)

13. INSTALLATIONS AND CONSTRUCTION

AD-401 068 Div. 13, 26
(TISTP/FEM) OTS price $1.10

California U., Los Angeles.
CONVERGENCE PROPERTIES OF AN ALGORITHM FOR LEARNING TO CLASSIFY,
by Zivia S. Wurtele. 17 Dec 62, 9p. 1 ref.
(Working paper no. 26)
Unclassified report

DESCRIPTORS: *Management engineering, *Classification, Personnel, Sampling, Communication theory, Algebra, Vector analysis, Decision making, Learning.

A problem which involves a fairly simple form of decision making -- classifying -- and a special type of algorithm for learning to solve it is discussed. The problem is that of classifying correctly individuals which are drawn at random from a population which is partitioned into a finite number of categories. The learning process is required to be a step-by-step procedure in which observations are made on individuals one at a time. The current estimate of the required partitioning may be adjusted after each observation on the basis of knowledge of the category in which the individual observed falls. At any given time, the current estimate of the partitioning is all that is held in memory; past history is lost insofar as it has been incorporated into the present estimate. The learning process of preceptrons, as well as that of other artificial intelligences, is of this general form. (Author)

AD-401 138 Div. 13, 25
(TISTP/GRW) OTS price $2.60

Aerospace Corp., Los Angeles, Calif.
THERMOELASTIC VIBRATIONS OF A BEAM,
by J. P. Jones. 20 Feb 63, 25p. incl. illus. 12 refs. (Rept. no. TDR-169(3153-06)TR-1)
(Contract AF 04(695)169)
(BSD TDR 63-17) Unclassified report

DESCRIPTORS: *Beams (Structural), *Deformation, *Thermal insulation, Thermocouples, Structural properties, Motion, Thermal stresses, Loading (Mechanics), Vibration, Mathematical analysis.

The equations of motion of a beam with the lateral surface thermally insulated are derived, including the effects of shear deformation and rotatory inertia. Thermoelastic coupling in the heat conduction equation and in the elastic consititutive relations is also included. Axial deformations of the beams are taken into account. Two examples are discussed. (Author)

AD-401 482 Div. 13
(TISTM/RGR) OTS price $7.60

Fritz Engineering Lab., Lehigh U., Bethlehem, Pa.
EXPERIMENTS ON BRACED WIDE-FLANGE BEAMS.
Rept. on Welded Continuous Frames and Their Components,
by G. C. Lee, A. T. Ferrara and T. V. Galambos. Mar 63, 70p. incl. illus. tables, 9 refs.
(Rept. no. 205H.6)
(Contract Nonr-61003)
Unclassified report

DESCRIPTORS: *Beams (Structural), Steel, Load distribution, Failure (Mechanics), Moments, Deformation, Plasticity.

A description is presented of fourteen experiments on wide-flange beams braced by purlins. These experiments were performed to study the bracing requirements of plastically designed beams. All fourteen beams performed in a satisfactory manner by delivering a plastic hinge of sufficient rotation capacity. The results indicate that beam-bracing members need to possess only nominal bending stiffness. Failure in each test was precipitated by combined local and lateral-torsional buckling. (Author)

AD-401 649 Div. 13, 17
(TISTE/CRJ) OTS price $1.25

Fritz Engineering Lab., Lehigh U., Bethlehem, Pa.
THE EXPERIMENTAL BASES FOR PLASTIC DESIGN--A SURVEY OF THE LITERATURE.
Report on Plastic Design in High Strength Steel,
by M. G. Lay. Mar 63, 37p. refs. (Rept. no. 297.3)
(Contract Nonr 61003)
Unclassified report

DESCRIPTORS: *Beams (Structural), *Plasticity, Materials, Steel, Elasticity, Stresses, Shear stresses, Deflection, Bibliographies.

Contents:
Stress-strain relationships
Simple beams
Continuous beams
Frames
Deflections and rotations
Shear
Compression plastic modulus
Local buckling
Instability of compression members
Lateral buckling
Connections
Variable and dynamic loading
Frame instability
High strength steels

AD-402 380 Div. 13, 12
(TISTA/GEC) OTS price $1.75

MRD Div., General American Transportation Corp., Niles, Ill.
WASTE DISPOSAL FOR AEROSPACE MISSIONS.

Final rept., Mar 61-Aug 62 on 'Equipment for Life Support in Aerospace,
by P. P. Nuccio, C. M. Tomsic, and J. D. Zeff.
Jan 63, 47p. incl. illus. tables, 8 refs.
(Rept. no. MRD 1161-51)
(Contract AF 33(616)8203, Proj. 6373)
(AMRL-TDR-63-4) Unclassified report

DESCRIPTORS: *Wastes (Sanitary engineering), Incinerators, Specific heat, Energy, Oxygen, Combustion, Space flight, Disposal.

This report summarizes a program to develop a 3-man, laboratory-model, waste-disposal system for a 14-day aerospace mission. The program was divided into 2 phases. First, an experimental phase was undertaken to determine the thermal properties of the wastes using an experimental disposal system. The experimental phase determined that: the specific heat of the wastes involved is 0.625 Btu/degree F-lb; the ignition temperature of the wastes is 700 F; incineration using pure O2 at 160 mm Hg absolute generates 100 watts after ignition has been attained; and thermal decomposition of the wastes requires a continuous input of 390 watts for 12 hours. Based upon the power requirements and a mass penalty of 0.15 pound/watt, incineration with pure O2 was found to be the best waste-disposal technique for a 3-man, 14-day mission. In the second phase, the laboratory model was designed, fabricated, and tested. The complete system weighed 81 lbs and occupied 3.1 cu ft. It was determined experimentally that a complete incineration cycle requires 2.6 kw-hr of electrical energy and 1/2 lb of O2, over a 12-hour period. (Author)

14. MATERIALS (NON-METALLIC)

AD-401 055 Div. 14, 4
(TISTM/ODN) OTS price $1.60

Armour Research Foundation, Chicago, Ill.
PREPARATION AND EVALUATION OF NEW HYDRAULIC FLUIDS.
Progress rept. for 28 Dec 62-27 Jan 63,
by Irvine J. Solomon. 27 Jan 63, 10p. incl. illus. tables, 8 refs. (Rept. no. ARF-C6001-2)
(Contract NObs-88249)
Unclassified report

DESCRIPTORS: *Hydraulic fluids, *Sulfur compounds, Fluorination, Viscosity, Vapor pressure, Tables, Density, Molecular structure, Synthesis (Chemistry), Fluorides.

AD-401 114 Div. 14
(TISTM/BRW) OTS price $2.60

Brown U., Providence, R. I.
STUDY OF TiC CRYSTALS,
by Hun-chiang Yeh. Feb 63, 17p. incl. illus. table, 17 refs. (Rept. no. DA-G36)
(Grant DA-ARO(D)-31-124-G36)
(AROD rept. no. 2662:5) Unclassified report

DESCRIPTORS: *Titanium compounds, *Single crystals, Electron microscopy, Mechanical properties, Hardness, Plasticity, Oxidation, Crystal lattice defects, Carbides, Crystal structure.

Electron microscopy studies of TiC were shown to be feasible. The dislocation etch-pit shape was found to be orientation dependent. The plastic deformation by compression at elevated temperatures was studied. The slip system was experimentally determined as (111) <110>. The properties of TiC were found to be very analogous to those of diamond cubic semiconductors. The boundary in TiC is believed to be partially covalent. (Author)

AD-401 115 Div. 14
(TISTM/LMH) OTS price $9.10

Atlantic Research Corp., Alexandria, Va.
IMPROVEMENT OF THE USEFULNESS OF PYROLYTIC GRAPHITE IN ROCKET MOTOR APPLICATIONS.
Final technical summary rept., 1 June 60-31 Dec 62,
by James D. Batchelor, Edwin F. Ford, and Eugene L. Olcott. Feb 63, 96p. incl. illus. tables.
(Contract DA-36-034-ORD-3279, Proj. TB 4-004)
Unclassified report

DESCRIPTORS: *Graphite, *Rocket motors, X-ray diffraction analysis, Microstructure, Rocket motor nozzles, Tests, Failure (Mechanics), Coatings, Carbon, Analysis.

AD-401 190 Div. 14
(TISTB/AW) OTS price $3.60

Armour Research Foundation, Chicago, Ill.
GLASS FIBER STRENGTH ENHANCEMENT THROUGH BUNDLE DRAWING OPERATIONS.
Quarterly progress rept. no. 3, 7 Dec 62-7 Mar 63,
comp. by R. H. Cornish, R. M. Chaney and others. 7 Mar 63, 25p. incl. illus. tables (ARF rept. no. 8263-3)
(Contract N600(19)58450)
Unclassified report

DESCRIPTORS: *Glass textiles, *Ceramic fibers, Manufacturing methods, Surface-active substances, Metal coatings, Titanium alloys, Zirconium alloys, Tensile properties, Drawing (Machine processing).

Progress during this period may be summarized as follows: the glass fiber tester and its accessory enclosure were completed to facilitate drawing, capturing, and testing of virgin fibers in a controlled environment; wetting - dewetting studies on the candidate alloy coating materials were temporarily slowed; investigation of metallizing techniques utilizing both precoating and post - draw - coating were continued, using the previously reported titanium and zirconium doped alloys, deposited coating of the noble metals, and some work with drawing of glass - Kovar - glass and glass - aluminium glass systems; and bundle drawing investigations were extended to include sheathed and sheathless bundles of glass - metal - glass composite fibers and soft glass-coated glass fibers in addition to continued work with the metallic matrices. Bundles of round and semi-elliptical submicron fibers were successfully drawn using both the glass - glass and glass - metal glass combinations in sheathed and sheathless configurations. Dewetting continues to plague efforts to redraw in a metallic matrix. Initial conditions for the systematic drawing of bundles of submicron fibers were established. (Author)

AD-401 253 Div. 14
(TISTM/ODN) OTS price $1.60

Rock Island Arsenal Lab., Ill.
EVALUATION OF GREASES SPECIFIED BY AUTOMOBILE MANUFACTURERS FOR USE IN EXTENDED LUBRICATION OF CARS,
by S. Fred Calhoun. 3 July 62, 11p. incl. illus. table, 3 refs. (Rept. no. 62-2333)
(Proj. no. 593-21-060)
Unclassified report

DESCRIPTORS: *Lubricants, *Passenger vehicles, Stability, Tests, Specifications, Oxidation, Viscosity, Penetration, Corrosion inhibition, Molybdenum compounds, Barium compounds, Greases.

Six commercial greases of the type specified by automobile manufacturers for use in late model cars of the extended lubrication type were secured from a grease manufacturer. The greases were tested according to the requirements of and for antiwear and extreme pressure characteristics. The greases were all found to be below the specification standards in one or more of the following requirements: corrosion protection, antirust properties, apparent viscosity at low temperatures, mechanical stability and water stability. They gave better extreme pressure results but showed no consistent improvement in antiwear over the MIL-G-10924 greases. Tabular data and photographs are included in support of the conclusions. (Author)

AD-401 258 Div. 14, 16
(TISTM/ODN) OTS price $1.60

Army Prosthetics Research Lab., Walter Reed Army Medical Center, Washington, D. C.
PHYSICAL EVALUATION OF 87/10.5/2.5 BA/2-EHA/MAD ELASTOMER,
by Joshua Nelson. Mar 62, 7p. incl. illus. tables (Technical rept. no. 6207)
Unclassified report

DESCRIPTORS: *Elastomers, *Heart, *Acrylic resins, Materials, Deformation, Tensile properties, Low-temperature research, Mechanical organs, Polymerization, Films, Plastics, Mechanical properties, Valves.

The 87/10.5/2.5 BA/2-EHA/MAD elastomer was evaluated for physical properties. The properties possessed by this elastomer may be adequate for heart valve application. Additionally, the excellent low temperature stiffness in flexure of this elastomer appears advantageous as a substrate material in the dilaminar acrylate glove. (Author)

AD-401 300 Div. 14, 4
(TISTM/TCG) OTS price $3.60

United States Rubber Co., Wayne, N. J.
PHOSPHONITRILIC POLYMERS STABLE AT HIGH TEMPERATURES.
Technical rept. no. 1, 19 Nov 62-28 Feb 63, by Harold K. Garner, Gerald J. Klender and James E. Owen. 8 Apr 63, 35p. incl. tables. (Contract NObs-88232, Proj. SR007-03-03)
Unclassified report

DESCRIPTORS: *Thermoplastics, *Thermosetting plastics, *Phosphonitrile chlorides, *Heat-resistant plastics, *Organic compounds, Polymers, Substitution reactions, Separation, Solvent action, Reaction kinetics, Chemical bonds, Spectra (Infrared), Synthesis, Plastics.

The development of thermoplastic and thermosetting high-temperature-stable resins for electrical applications from phosphonitrilic chloride trimer is reported. Synthesis of monomeric phosphonitrilic derivatives in which the functionality of the phosphonitrilic ring has been reduced to 2, 3, or 4 are covered. This was done by replacing some of the chlorines with stable phenyl or phenoxy groups. In some derivatives, chlorines were replaced with reactive ethoxy or dimethylamino groups. (Author)

AD-401 329 Div. 14, 17
(TISTM/ODN) OTS price $1.60

General Dynamics/Convair, San Diego, Calif.
EFFECT OF ALUMINUM ALLOYS ON BOND STRENGTH. Report on Material - Adhesives - Metlbond 4021 (Narmco Resins and Coatings Co.),
by H. L. Barringer, G. L. Picotte, and E. E. Keller. 23 Oct 58, 14p. incl. tables (Rept. no. 8926-130; 57-983)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Aluminum alloys, *Adhesives, *Crystal structure, Adhesive tapes, Tensile properties, Low-temperature research, Bonded joints, Sheets, X-ray diffraction analysis, Tests, Heat treatment, Bonding, Mechanical properties.

The differences between the surfaces of clad 2024-T3, clad 2024-T86 and bare 7075-T6 aluminum alloys caused by variations in heat treatment or alloy composition with respect to adhesive bond strength were observed by means of tests made with surfaces which were primed with Metlbond 4021 primer and joined with AT 10 adhesive tape. The results of tensile shear tests at -67 F., room temperature and 300 F., and peel tests at room temperature showed that no significant effect upon adhesive bond strengths occurred from the surface differences indicated. (Author)

AD-401 331 Div. 14
(TISTM/ODN) OTS price $1.10

General Dynamics/Convair, San Diego, Calif.
EFFECT OF TAPES ON STRUCTURAL ADHESIVE STRENGTH. Report on Material - Adhesives - Structural - Protective Tapes for,
by V. L. Lintvedt, G. L. Picotte, and R. R. Reschan. 1 Oct 58, 7p. incl. table (Rept. no. 8926-137; MP-58-095)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Adhesive tapes, *Adhesives, *Bonded joints, Rubber adhesives, Storage, Aging (Materials), Aluminum alloys, Tensile properties, Shear stresses, Low temperature research, Tests, Mechanical properties.

The effect of applied Tape #347 on the tensile shear strength of adhesive bonded joints comprised of EC 1290 and AF 10 structural adhesive components was determined. The specific effect observed related to the effect of tape application and storage on precured EC 1290 primer. The protective tape consisted of paper backing to which rubber base adhesives are applied. No significant change in adhesive bond strength was caused by 3M Tape #347 after upwards to 160 days with it in contact with precured EC 1290 primer. (Author)

AD-401 332 Div. 14
(TISTM/ODN) OTS price $1.10

General Dynamics/Convair, San Diego, Calif.
ELEVATED TEMPERATURE AND FUEL RESISTANCE. Report on Material - Sealants - Fuel Tank,
by R. R. Reschan, E. E. Keller, and W. M. Sutherland. 28 Jan 59, 6p. incl. table. (Rept. no. 8926-139; MP 58-074)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Fuel tanks, *Fuel seals, High-temperature research, Reviews, Sealing compounds, Materials.

State of art review during 1958 showed that rubber-like, room temperature curing, fillet forming

tank sealants were limited to use in the 275 to 300 F temperature range. Progress during 1957 resulted in the development of General Electric Co. R.T.V. Silicones which would withstand temperatures to 500 F, but could not withstand hydrocarbon fuel impingement. Hydrocarbon fuel resistance was not improved in these materials during 1958. Development progress with sealants based on DuPont Viton A synthetic elastomer were reported during the year, but the development of this material, which is useful to 450 F, was not complete at the year's end. (Author)

AD-401 334 Div. 14, 26
(TISTM/AMS) OTS price $3.60

General Dynamics/Convair, San Diego, Calif.
EFFECT OF TESTING VARIABLES ON TENSILE SHEAR STRENGTH.
Report on Material - Adhesives - Structural, by B. E. Bergstrom, G. L. Picotte, and E. E. Keller. 18 Aug 58, 37p. incl. illus. tables. (Rept. no. 8926-135; 57-896)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Adhesives, *Metal joints, Shear stresses, Tensile properties, Time, Loading (Mechanics), Heating, Tests, Controlled atmospheres, Aging (Materials), Humidity, Test methods, Aluminum alloys, Sheets, Bonding, Cladding, Experimental data, Panels (Structural).

The effects of (1) relative atmospheric humidity; (2) rate of loading test specimens; (3) removal of excess test specimen flash; (4) bonding press pre-heating; and time lapse from bonding to testing were determined. Tapes which were subjected to high relative humidity showed decreased tensile shear strength. Strength increases appeared to increase when testing speeds were doubled. Flash removal enhanced tensile shear strength results. No significant differences in test result occurred between tests prepared with cold or pre-heated presses. Time lapse variations between curing and testing were not significant in test results. (Author)

AD-401 335 Div. 14, 17
(TISTM/ODN) OTS price $1.60

General Dynamics/Convair, San Diego, Calif.
EFFECT OF VARIATIONS IN BONDING PRESSURES AND TEMPERATURES ON JOINT STRENGTHS.
Report on Material - Adhesives - Structural - EC-1459, EC-1469, AF-102 (Minnesota Mining and Manufacturing Co.),
by R. W. Lawley, Jr., M. C. Miyaji, and W. M. Sutherland. 9 July 57, 17p. incl. tables (Rept. no. 8926-129; 57-461)
(Contracts AF 33(657)8926 and AF 33(600)30169)
Unclassified report

DESCRIPTORS: *Adhesives, *Aluminum alloys, *Honeycomb cores, Pressure, Temperature, Sandwich construction, Bonded joints, Tensile properties, Aging (Materials), Shear stresses, Compressive properties, Mechanical properties, Bonding.

The effects of variations in pressures and temperatures for curing adhesive bonded joints made between 2024-T86 aluminum alloy overlaps, and 2024-T86 aluminum alloy face plates and 3003-H19 aluminum alloy honeycomb cores with EC-1459, EC-1469 and AF-102 adhesives were determined. The curing cycles used were (1) 150 psi pressure at 350 F for 2 hours, (2) 100 psi pressure at 250 F for 30 minutes followed by 350 F for 2 hours, (3) 100 psi pressure at 350 F for 2 hours, and (4) 85 psi pressure at 350 F for 2 hours. The first two of the four cure cycles gave satisfactory -67 F tensile shear strengths. The 216 F tensile shear strength obtained by the last three cure cycles was slightly low. The metal-to-metal peel strength produced by all four cycles was satisfactory. The honeycomb sandwich flexural strengths at -67 F were satisfactory throughout. The room temperature peel strengths of the honeycomb sandwich varied considerably and only the second cure cycle produced satisfactory strengths. (Author)

AD-401 364 Div. 14
(TISTM/RGR) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
FOAMED PLASTICS ON A BASE OF ORGANOSILICON RESINS AND THEIR COMBINATIONS WITH ORGANIC POLYMERS.
by M. Ya. Borodin, Z. I. Kazakova, and others. 1 Mar 63, 5p. (Trans. no. FTD-TT-62-1654 from Khimiya i Prakticheskoye Primeneniye Kremneorganichezkikh Soyedineniy, Trudy Konferentsii, Nr 6, Doklady, Diskussii, Besheniye, Izd. vo AN SSSR, Leningrad, pp. 304-306, 1958)
Unclassified report

DESCRIPTORS: *Expanded plastics, *Silicon plastics, Mechanical properties.

AD-401 386 Div. 14, 17
(TISTM/ODN) OTS price $1.60

General Dynamics/Convair, San Diego, Calif.
EFFECT OF BOND VOIDS ON FATIGUE STRENGTH.
Report on Material - Adhesives - Structural, by C. Conaway, G. D. Lindeneau, and W. E. Wise. 8 Apr 58, 14p. incl. illus. tables (Rept. no. 8926-136; 57-510)
(Contracts AF 33(657)8926 and AF 33(600)31174)
Unclassified report

DESCRIPTORS: *Aluminum alloys, *Honeycomb cores, *Adhesives, Fatigue (Mechanics), Metal plates, Mechanical properties, Bonded joints, Failure (Mechanics), Deformation, Loading (Mechanics), Bonding, Tests.

Axial tension-tension fatigue tests were made with adhesive bonded aluminum alloy honeycomb panels comprised of 2024 aluminum alloy face plates, and EC 1469 adhesive. Voids of various sizes were introduced into the test specimens to permit study of their effect on fatigue strengths. Bond endurance was found to depend on bond perimeter as well as area; longer perimeters with a given area produce longer life within limits. Voids were not found to expand or propagate under repeated loads. (Author)

AD-401 477 Div. 14
(TISTM/SJR) OTS price $1.10

Olin Mathieson Chemical Corp., New Haven, Conn.
B10H12 POLYMERS.
Interim rept. no. 2,
by T. L. Heying, H. A. Schroeder and others. 15 Apr 63, 7p. incl. illus. table (Technical rept. no. 13)
(Contract Nonr-339500, Proj. NR 356 431)
Unclassified report

DESCRIPTORS: *Organic compounds, *Organic phosphorus compounds, Azides, Decaboranes, Composite materials, Asbestos, Glass textiles, Carbon, Tensile properties, Polymerization, Molecular weight, Spectra (Infrared), Heat resistant plastics, Stability, Laminated plastics, Organic coatings, Metals, Synthesis, Polymers.

The synthesis and heat stability of a polymer of decaborane containing phosphorus, nitrogen and phenyl residues are discussed. The polymer was composited with asbestos, refrasil or carbon fibers, laminated on glass cloth, and also tested as a coating for metals. Molecular weight and infrared studies were performed.

AD-401 508 Div. 14, 1
(TISTM/CCH) OTS price $8.60

Army Engineer Waterways Experiment Station, Vicksburg, Miss.
BEACH STABILIZATION TESTS OF LANDING MATS AND PREFABRICATED MEMBRANES,
by S. G. Tucker and J. L. Garrett. Feb 62, 1v. incl. illus. tables (Technical rept. no. 3-592)
Unclassified report

DESCRIPTORS: *Landing mats, *Membranes, *Beaches, Effectiveness, Steel, Cotton, Nylon, Aluminum, Synthetic rubber, Trafficability, Stabilization.

Field tests were conducted at La Turballe Beach and Suscinio Beach, on the Brittany coast of France, on three metal landing mats and three prefabricated membranes to determine their suitability and effectiveness as portable surfacing expedients for increasing the trafficability potential of unprepared beaches for emergency offshore discharge operations. Mats tested were: the PSP, a light pierced steel plank; the M8, a heavier pierced or perforated steel mat; and the T11, an extruded aluminum mat. Membranes tested were: the T1, a No. 8 cotton duck, vinyl-coated membrane; and the T12 and T14, neoprene-coated nylon membranes. All materials and/or combinations tested increased the trafficability potential of vehicular traffic across the beaches. Of the surfacing materials tested, the M8 steel landing mat underlain with membrane was the most satisfactory in performance. All membranes performed satisfactorily underneath the M8 steel mat. Membranes improved the performance of the PSP, but the No. 8 cotton duck (T1) sustained an appreciable number of punctures by the overlaid mat panels. All items tested can be rapidly removed and reused at various locations by field troops. (Author)

AD-401 550 Div. 14
(TISTM/ODN) OTS price $1.50

Rock Island Arsenal Lab., Ill.
EFFECT OF STORAGE ON LUBRICATING GREASE COMPATIBILITY,
by F. S. Meade and R. L. Young. 9 Jan 63, 51p. incl. illus. tables (Rept. no. 63-88)
(DA Project no. 1-A-0-24401-A-107)
Unclassified report

DESCRIPTORS: *Lubricants, *Greases, Storage, Mechanical properties, Chemical analysis, Test methods, Experimental data, Soaps, Mineral oils, Compatibility.

The compatibility of binary mixtures of twelve types of lubricating greases, when mixed in the three component ratios 10%-90%, 50%-50%, and 90%-10%, and after storage for eighteen months was determined. Approximately 15% of the grease mixtures were re-examined for compatibility after three years' storage. The greases studied included soap thickened, non-soap thickened, and an organic thickened product. Both mineral oil and synthetic fluid types were represented. Approximately 64% of the binary grease mixtures were compatible after an eighteen-month storage period. As the storage period was increased to three years, the number of compatible mixtures was decreased. More grease mixtures were incompatible after eighteen months and after three years storage than were incompatible immediately after preparation. In only a very few instances did grease mixtures, which were incompatible immediately after preparation, become compatible after storage. (Author)

AD-401 656 Div. 14, 26, 17
(TISTM/AM) OTS price $1.50

Mississippi State U., State College.
NONDESTRUCTIVE ANALYSIS OF THE BRITTLE FRACTURE BEHAVIOR OF CERAMIC MATERIALS.
Final rept., 1 Sep 60-31 Aug 61,
by J. H. Lauchner, T. F. Torries, and J. L. Pentecost. Feb 63, 51p. incl. illus. 62 refs.
(Contract AF 33(616)7347, Proj. 7360)
(ASD TR 61-436, pt. 1) Unclassified report

DESCRIPTORS: *Non-destructive testing, Stresses, Fracture (Mechanics), Ceramic materials, Cermets, Graphite, Mechanical properties, Glass, Ductility, Dielectric properties, Failure (Mechanics), Bibliographies.

A literature survey of theoretical and experimental approaches to brittle fracture was directed toward a nondestructive evaluation point of view. Surface decorating techniques were investigated. A technique for calculating maximum stress in an elastic loop was developed and applied to the measurement of the strength of glass fibers from three to seven mils in diameter. The strength values were related to surface condition by surface decoration techniques. Surface flaw decoration of cleaned and polished surfaces was performed by condensation of water on the surface. Minute flaws estimated to be less than 1000 angstroms deep were easily revealed. Capacitance behaviors of polycrystalline materials were studied. Residual stress effects were observed under statically loaded conditions. (Author)

AD-401 658 Div. 14
(TISTM/BRW) OTS price $1.50

Armour Research Foundation, Chicago, Ill.
ULTRASONIC METHODS FOR NONDESTRUCTIVE EVALUATION OF CERAMIC COATING.
Final rept., 1 Mar 61-28 Feb 62 on The Chemistry and Physics of Materials,
by K. E. Feith and W. E. Lawrie. Feb 63, 44p. incl. illus.
(Contract AF 33(616)6396, Proj. 7360)
(WADD TR 61-91, pt. 2) Unclassified report

DESCRIPTORS: *Ceramic coatings, *Nondestructive testing, Ceramic materials, Metals, Bonding, Mechanical properties, Adhesion, Acoustic equipment, Display systems, Ultrasonic radiation.

This report describes investigations into the use of ultrasonic techniques to determine the strength and integrity of ceramic-metal bonds. An acoustic image converter system was used successfully to obtain a television type display of 1/32 in. diam. laminar defects in a zirconium oxide-inconel bond. The measured defect thickness varied between 300 and 500 microinches or about a factor of three greater than the average large grain in the coating material. Schlieren optical and acoustic lens techniques were used to visually investigate detailed properties of ultrasonic fields and the interaction of ultrasonic energy with a solid. The theory of Rayleigh waves was reviewed to provide a framework for experimental integrity determinations of ceramic coatings. (Author)

AD-401 705 Div. 14, 8
(TISTM/AMS) OTS price $2.60

Army Electronics Research and Development Agency, Fort Monmouth, N. J.
DIELECTRIC CONSTANT AND LOSS TANGENT OF MICROWAVE FERRITES AT ELEVATED TEMPERATURES,
by T. Collins and I. Bady. Apr 62, 13p. incl. illus. tables, 3 refs. (ASRDL Technical rept. no. 2273)

Unclassified report

DESCRIPTORS: *Ferrites, *Dielectric properties, *Microwaves, High temperature research, Perturbation theory, Temperature, Circuits, Nickel, Nickel compounds, Cobalt compounds, Magnesium compounds, Aluminum compounds.

Measurements were made of the real part of the dielectric constant and loss tangent of 32 commercial ferrites at x-band at temperatures from 25 to 250 C, but not exceeding the curie temperature. A modified perturbation technique was used for these measurements. The principal modification included a correction based on the diameter and real part of the dielectric constant. For a sample diameter of 35 mils, the correction ranged from 4 to 10% for dielectric constants of 7 to 16, respectively. Expressions were also derived for the correction due to the contribution of the irises and metal losses to the cavity Q, since the resonant frequency of the cavity changed when a sample was introduced. The accuracy in the measurement of the real part of the dielectric constant is ± 3%, where 1% is attributed to the taper and ellipticity of the samples and 2% to the electrical measurement. The accuracy in the measurement of the loss tangent is ± 0.0005. (Author)

AD-401 734 Div. 14
(TISTM/BRW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CRYSTALLINE STRUCTURE OF THE NEW CLOSE-GRAINED MODIFICATION OF SILICA, SiO2,
by S. M. Stishov, and N. V. Belov. 13 Feb 63, 7p. incl. illus. tables (Trans. no. FTD-TT-62-1709 from Doklady Akademii Nauk SSSR, 143:4, pp. 951-954, 1962)

Unclassified report

DESCRIPTORS: *Silicon compounds, *Crystal structure, High pressure research, High temperature research, Crystal lattices, X-ray diffraction analysis, Oxides.

AD-401 773 Div. 14
(TISTM/CCH) OTS price $2.60

RAND Corp., Santa Monica, Calif.
SELECTION OF MATERIALS IN MINIMUM WEIGHT DESIGN,
by William R. Micks. Mar 63, 23p. (Rept. no. P-2729)

Unclassified report

DESCRIPTORS: *Materials, *Design, Costs, Processing, Military requirements, Structural parts, Loading (Mechanics), Structural properties, Stresses, Weight.

The purpose of this paper is to demonstrate how minimum-weight design methods assist in the selection of materials. The area of design discussed deals with structural or load-carrying components. The principles apply to all components having the design function of transmitting forces through space, including such items as jet engines, submarines, bridges, etc. (Author)

AD-401 789 Div. 14, 4
(TISTM/SJR) OTS price $2.60

Midwest Research Inst., Kansas City, Mo.
SYNTHESIS OF ELASTOMERS CONTAINING Si-N BONDS IN THE MAIN CHAIN.
Quarterly progress rept. no. 6, 1 Jan-31 Mar 63,
by L. W. Breed and R. L. Elliott. 31 Mar 63, 22p. incl. illus. tables.
(Contract DA-23-072-ORD-1687, Proj. 593-32-002)

Unclassified report

DESCRIPTORS: *Organic compounds, *Heat resistant plastics, *Elastomers, Hydrolysis, Stability, Silicon compounds, Nitrogen compounds, Heterocyclic compounds, Catalysts (Chemistry), Chlorides, Ammonium compounds, Tin compounds, Antimony compounds, Titanium compounds, Bromides, Aluminum compounds, Sulfates, Synthesis (Chemistry).

Improvement in the hydrolytic stability of polymers prepared by the condensation of silazanes with organic diols is observed when N-H groups in the polymer chain are replaced by N-methyl groups. Several new diols were examined in this type of polymerization, but none of the materials equal resorcinol, 1,4-benzenedimethanol, 4'4-dihydroxybiphenyl, or bisphenol 'A'. In studies of the reactions of cyclic silicon-nitrogen compounds under the influence of acidic or basic catalysts at 175 C, it was concluded that the chief reaction involves randomization of the cyclic structure. A new polymer containing phenylene groups and silicon and nitrogen in the main chain is reported. (Author)

AD-401 800 Div. 14
(TISTM/LMH) OTS price $8.60

Illinois U., Urbana.
DEFLECTIONS OF REINFORCED CONCRETE FLOOR SLABS,
by M. D. Vanderbilt, M. A. Sozen, and C. P. Siess. Apr 63, 287p. incl. illus. tables, 47 refs.
(Structural research series no. 263)
(Contract NBy-37633)

Unclassified report

DESCRIPTORS: *Floors, *Structures, Construction, Materials, Deformation, Load distribution, Standards, Civil engineering, Moments, Concrete, Deflection.

AD-401 854 Div. 14
(TISTM/BRW) OTS price $1.60

Bell Aerosystems Co., Buffalo, N. Y.
MODULUS OF RUPTURE, THERMAL CONDUCTIVITY, AND THERMAL EXPOSURE TESTS ON FOAMED ALUMINUM OXIDE AND FOAMED ZIRCONIUM OXIDE,
by D. J. Powers. Mar 63, 14p. incl. illus. tables. (Rept. no. 63-13(M))
(Contract AF 33(657)8555)

Unclassified report

DESCRIPTORS: *Ceramic materials, Mechanical properties, Thermal conductivity, Aluminum compounds, Zirconium compounds, Oxides, Porous materials, Foams.

Physical property data at room temperature and at high temperatures are presented on foamed aluminum oxide and foamed zirconium oxide materials. Tests conducted were modulus of rupture, thermal conductivity, and thermal exposure. (Author)

Division 14 - MATERIALS (NON-METALLIC)

AD-401 908 Div. 14
(TISTM/LMH) OTS price $1.60

Smith, A. D. Corp., Milwaukee, Wis.
GLASS SURFACE CHEMISTRY FOR GLASS FIBER REINFORCED PLASTICS.
Monthly progress rept. no. 13, 1-31 Mar 63, 15 Apr 63, 6p. illus. tables, 7 refs.
(Contract NOw 62-0679-c)
Unclassified report

DESCRIPTORS: *Adhesion, *Epoxy plastics, Glass textiles, Bonding, Plastics, Failure (Mechanics), Surfaces, Tests, Surface properties, Coatings.

Bond life of Owens-Corning HTS finished E glass was more than 12 days in 190 F water and is still on test. Wetting of HTS glass, as determined by the captive bubble technique, was similar to epoxy-resin-coated glass. The contact angle was 81-90, indicating a high degree of non-wetting by water. Bond life of aluminum was also studied as part of the work on bond strength testing. Bond life of as-rolled aluminum, whether treated with A-1100 or not, was poor. Although metal coatings might be effective in preventing strength deterioration of glass fibers due to moisture, development work would apparently be needed to obtain effective moisture-resistant bonding of epoxy resin to the aluminum-coated glass fibers. Recent work has indicated that the bond strength test could be modified to minimize the effect of stresses created by the shrinkage of the high expansion resin during curing. (Author)

AD-402 080 Div. 14, 17
(TISTM/LMH) OTS price $8.10

Lockheed Aircraft Corp., Sunnyvale, Calif.
COMPOSITE MATERIALS: AN ANNOTATED BIBLIOGRAPHY, comp. by Helen M. Abbott. Feb 63, 89p.
(Special bibliography rept. 5-10-62-52; Rept. no. 5-10-62-52)
Unclassified report

DESCRIPTORS: *Bibliographies, *Heat resistant materials, *Composite materials, Refractory materials, Boron alloys, Glass textiles, Metal plates, Aluminum alloys, Plastics, Powders, Metals, Heat resistant metals and alloys, Preparation.

AD-402 160 Div. 14
(TISTM/ODN) OTS price $1.60

General Dynamics/Convair, San Diego, Calif.
''HEAT BARRIER'' CHARACTERISTICS.
Rept. on Material - Insulation - Thermal Structural Laminating,
by H. H. Stier and W. M. Sutherland. 18 Oct 57, 9p. incl. illus. (Rept. no. 8926-123)
(Contract AF 33(600)8926)
Unclassified report

DESCRIPTORS: *Thermal insulation, *Aluminum alloys, *Laminates, Extrusion, Rivets, Silicone plastics, Halocarbon plastics, Riveted joints, Materials, Tests, Metal plates, Heat transfer.

The effectiveness of CTL-91-D and Rocketon and Missileon when interposed as a laminate between a clad 2024-T3 aluminum alloy plate and a 2024-T3 aluminum alloy extrusion and fastened with 2017-T31 aluminum alloy rivets, was observed in terms of the temperature difference between the hot side of the plate and the extreme edge of the outstanding web of the Tee-extrusion stiffener on the cold side of the heated plate stiffener combination. The transfer of heat from the plate into the Tee-extrusion through the metallic path provided by the rivets rendered the 'heat barrier' ineffective. The effectiveness of silicone rubber and foamed silastic and teflon sheet as 'heat barriers' in 0.07 to 0.25-in thicknesses was checked by observing the temperature drop through them when they were placed on a heated hotplate. The small temperature drop observed in these materials during test indicated their ineffectiveness as 'heat barriers.' (Author)

AD-402 162 Div. 14
(TISTM/AM) OTS price $1.10

General Dynamics/Convair, San Diego, Calif.
EFFECT OF SURFACE PREPARATION ON ADHESIVE BOND STRENGTHS.
Rept. on Material - Stainless Steel - Type 410, Casting,
by H. Pearson, G. L. Picotte, and E. E. Keller. 30 Dec 57, 7p. incl. illus. tables (Rept. no. 8926-127)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Cleaning compounds, *Cleaning, *Adhesives, *Bonding, Aluminum alloys, Stainless steel, Tensile properties, Joints, Chromium compounds, Fluroides, Sulfates, Data, Solutions, Alloys.

The comparative effectiveness of a sulfuric acid-sodium dichromate and a boiling hydrofluoric acid surface preparation in providing suitable structural adhesive bonds between Type 410 stainless steel castings, and 7075-T6 clad and 2024-T86 bare aluminum alloys was determined. The sulfuric acid-sodium dichromate cleaner consisted of distilled water, 2% sulfuric acid and 2% sodium dichromate used at room temperature. The hydrofluoric acid cleaner consisted of a 10% aqueous hydrofluoric acid solution used at its boiling temperature for 5 minutes. The adhesives used to compare the adhesion characteristics of the different stainless steel surfaces were EC-1459 primer and AF-10 film (Minnesota Mining and Manufacturing Co.), and they were cured at 350 F for 2 hours under a pressure of 100 psi. Satisfactory adhesive bond strengths were obtained with both surface preparation methods. The hydrofluoric acid method generally provided the higher strengths, however. (Author)

AD-402 163 Div. 14, 17
(TISTM/ODN) OTS price $1.10

General Dynamics/Convair, San Diego, Calif.
LONG TERM EFFECTIVENESS IN MARINE ATMOSPHERES.
Rept. on Material - Finishes and Coatings - ''Touch-Up'' Corrosion Preventatives,
by A. F. Hooper, J. C. George, and E. E. Keller. 29 Apr 59, 7p. incl. illus. (Rept. no. 8926-131)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Protective treatments, *Aluminum alloys, *Corrosion inhibition, Finishes and finishing, Chromic acids, Corrosion, Sheets, Surfaces, Sprays, Coatings, Screws, Stainless steel.

The effectiveness of 10% chromic acid solution, Alodine 1200, Iridite 14, and Bonderite 710 when applied to clad 7075-T6 aluminum alloy sheet provided with stainless steel metal screws and Huck lockbolts, in retarding industrial-marine atmospheric corrosion was checked. Ten months outdoor exposure of representative test panels revealed that none of the 'touch-up' finishes were effective in retarding corrosive attack for this length of time. (Author)

AD-402 168 Div. 14
(TISTM/ODN) OTS price $1.10

General Dynamics/Convair, San Diego, Calif.
SKYDROL 500 HYDRAULIC FLUID RESISTANCE.
Rept. on Material - Adhesives - Structural - EC 1660 and AF-32,
by A. F. Hooper, J. C. George, and E. E. Keller.
11 Feb 59, 4p. tables (Rept. no. 8926-147)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Aluminum alloys, *Adhesive tapes, *Adhesives, Aging (Materials), Sheets, Hydraulic fluids, Tensile properties, Compatibility, Bonded joints, Bonding, Tests.

Tensile shear test specimens made from clad 2024-T3 aluminum alloy sheet in accordance with Specification Mil-A-5059B were bonded with EC 1660 primer and AF-32 adhesive tape. The primer pre-cure was done at 250 F for 30 minutes and the bond was effected by curing the joints at 350 F for 60 minutes under a pressure of 100 psi. Peel test specimens made from 0.020 inch thick by 1.00 inch wide 2024-T3 clad aluminum alloy also were fabricated with the above adhesives and bonding processes. Half of the specimens were immersed in Skydrol 500 hydraulic fluid for periods of up to 30 days and the remainder were stored under ambient conditions for comparison purposes. Tensile shear and peel test made after 1, 5, 10, 15, 25 and 30 days showed that the Skydrol 500 hydraulic fluid exerted no significant adverse influence on bond strengths. (Author)

AD-402 170 Div. 14, 17
(TISTM/ODN) OTS price $1.60

General Dynamics/Convair, San Diego, Calif.
QUALIFICATION TESTS FOR METAL-TO-METAL AND HONEYCOMB CORE PANEL BONDING OF ALUMINUM ALLOYS.
Report on Material - Adhesives - Structural - FM 58 (Bloomingdale Rubber Co.),
by H. H. Hunt, E. E. Bergstrom and others.
2 June 59, 15p. incl. tables, 9 refs. (Rept. no. 8926-149)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Metals, *Aluminum alloys, *Honeycomb cores, *Adhesives, Humidity, Sprays, Sea water, Salts, Tensile properties, Adhesive tapes, Processing, Specifications, Shear stresses, Compressive properties, Fuels, Compatibility, Films, Mechanical properties, Bonding, Tests.

Lap shear tensile and peel test specimens, incorporating 2024-T3 aluminum alloy sheet, and BR-223 adhesive primer and FM 58 film adhesive were prepared and tested in accordance with Specification Mil-A-5090B and Convair Specification 22-01310, respectively. In addition, 1/2 in. thick aluminum alloy honeycomb panels consisting of 0.020 in. thick clad 2024-T3 aluminum alloy face plates and 5052 aluminum alloy honeycomb core and the two adhesives mentioned were prepared and tested in accordance with Convair Specification 22-00401. The curing procedure involved in specimen preparation consisted of pre-curing at 175 F for 60 minutes and bonding at 350 F for 60 minutes under a pressure of 50 psi. The tests showed the FM 58/BR-223 adhesive system in conformance with Specification Mil-A-5090B requirements for tensile shear strength at -67 F., room temperature and 180 F.; and after exposure to JP-4 fuel, Skydrol 500, 100% relative humidity and salt spray. The adhesive system also was shown in conformance with flexural and peel strength requirements for aluminum honeycomb panel construction. Some of the peel tests indicated that the adhesive system could be used successively for large metal-to-metal bonds. (Author)

AD-402 174 Div. 14, 25
(TISTM/ODN) OTS price $1.10

General Dynamics/Convair, San Diego, Calif.
REFLECTANCE CHARACTERISTICS.
Rept. on Material - Finishes and Coatings - Reflective Surfaces for Plastic Laminates,
by J. Trias, F. M. Graber, and E. E. Keller.
1 Feb 60, 7p. incl. illus. (Rept. no. 8926-154)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Glass textiles, *Laminated plastics, *Polyester plastics, Surfaces, Tin, Aluminum, Flame spraying, Reflectometers, Reflection, Laminates, Surface properties.

Commercial aluminum foil (cemented), flame sprayed aluminum (0.003-in. thick commercially pure), and flame sprayed tin (0.003-in. thick commercially pure) were applied to polyester resin-fiberglass cloth laminate surfaces and the reflective spectra of the resultant reflective surfaces were determined with a Beckman DK-2 spectroreflectometer. The various spectra in the 300 to 2500 millimicron wavelength range are given. (Author)

AD-402 178 Div. 14, 16, 4
(TISTM/ODN) OTS price $.50

Coating and Chemical Lab., Aberdeen Proving Ground, Md.
APPLICATION OF THE INTERNAL STANDARDIZATION METHOD FOR THE GAS CHROMATOGRAPHIC DETERMINATION OF DRYING OIL FATTY ACIDS,
by George G. Esposito. 20 Mar 63, 9p. incl. tables (CCL Rept. no. 139)
(DA Proj. I-H-0-24401-A-110-05)
Unclassified report

DESCRIPTORS: *Fatty acids, *Organic coatings, *Fatty acid esters, Oils, Separation, Chemical analysis, Chromatographic analysis, Materials.

This investigation was conducted to determine a suitable method for obtaining quantitative data from the chromatographic separation of methyl esters prepared from oils used in organic coatings. The internal standard method is compared to the total area technique and found to be necessary for accurate analysis. The sample is saponified and the fatty acids isolated. A known weight of margaric acid, the internal standard, is added to a known amount of sample followed by methyl ester formation and separation of the esters on a polyester column by gas chromatography. The unreacted fatty acids are calculated individually and materials, such as dimers, trimers and adducts are determined by difference. (Author)

AD-402 225 Div. 14
(TISTM/LMH) OTS price $.50

Plastics Technical Evaluation Center, Picatinny Arsenal, Dover, N. J.
DEFENSE SPECIFICATIONS AND STANDARDS FOR AND RELATING TO REINFORCED PLASTICS,
by Norman E. Beach. Mar 63, 11p. incl. tables. (Plastec note no. 3)
Unclassified report

DESCRIPTORS: *Specifications, *Scientific research, *Laminated plastics, Laminates, Sandwich construction, Textiles, Department of Defense, Standards, Plastics, Materials.

AD-402 305 Div. 14, 26, 27
(TISTM/BRW) OTS price $1.00

Value Engineering Co., Alexandria, Va.
ELECTRODEPOSITION OF EROSION AND OXIDATION RESISTANT COATINGS FOR GRAPHITE.
Final summary rept.,
by E. Goodman and R. Thompson. 15 Mar 63, 17p. illus. tables.
(Contract N600(19)58317)
Unclassified report

DESCRIPTORS: *Refractory coatings, *Graphite, Metal coatings, Ceramic coatings, Cermets, Rocket motor nozzles, Oxidation, Erosion, Ceramic materials, Electrodeposition, Coatings.

Studies were made of electrodeposited metal-ceramic composite coatings for protection of graphite rocket nozzles against oxidation and erosion. A series of nozzles were coated with different thicknesses of the cermet and fired in a gaseous hydrogen-gaseous oxygen rocket motor. The data from these firings indicated that 2.0 to 2.5 mils is the optimum coating thickness. The effect of the concentration of ceramic particles in the plating bath on the amount of ceramic occluded in the coating was investigated. Results of this study showed that there was no effect on the amount of particles in the coatings. (Author)

AD-402 308 Div. 14
(TISTM/SJR) OTS price $.75

Mechanical Technology Inc., Latham, N. Y.
APPLICATION OF ROLLING ELEMENT COASTDOWN TECHNIQUES TO THE DETERMINATION OF LUBRICANT PROPERTIES,
by S. F. Murray. 8 Apr 63, 13p. illus. tables, 2 refs. (Rept. no. MTI-63TR13)
(Contract Nonr 372900)
Unclassified report

DESCRIPTORS: *Organic compounds, *Lubricants, Test methods, Friction, Mathematical analysis, Shear stresses, Lubrication, Viscosity, Roller bearings, Test equipment.

The concept of elastohydrodynamic lubrication is known to depend on the non-Newtonian properties of the lubricant. In a previously reported study; a technique was described for studying this behavior by measuring the coast-down characteristics of lubricated, instrument-size ball bearings. Essentially, this was accomplished by lubricating the bearing with a small quantity of the test oil, driving the bearing up to a predetermined speed by means of an air turbine and recording the deceleration of the bearing after the air supply had been cut off. While the results of that study were very interesting, significant differences between oils were obtained only when oils of high viscosity were used. In the current program, an attempt has been made to improve this situation by using somewhat different experimental techniques. These included: (a) Heavier rotors to increase the inertia of the rotating members; (b) Radial, rather than thrust-loaded bearings; (c) Elimination of windage losses by evacuating the system during the coastdown period. Major emphasis in this program has been to study oils of more reasonable bulk viscosity. (Author)

AD-402 312 Div. 14
(TISTM/AW) OTS price $1.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
EMPIRICAL CORRECTIONS FOR VARIABLE ABSORPTION OF SOFT X-RAYS BY MYLAR,
by Bernard J. Alley and James H. Higgins.
1 Mar 63, 17p. incl. illus. tables (Rept. no. RK-TR-63-7)
(Proj. 517-06-002)
Unclassified report

DESCRIPTORS: *Polyester plastics, *X-ray absorption analysis, Attenuation, Corrections, Aluminum, Sulfur, Chlorine, Standards, Films.

The characteristic X-rays of many light elements are strongly attenuated by 0.00025-inch Mylar. An empirical method was developed to correct for the effects of variable 0.00025-inch Mylar thickness on the analyses of these light elements. Linear relationships were established between correction factors for aluminum K-alpha radiation and those for sulfur K-alpha and chlorine K-alpha radiations. Aluminum K-alpha correction factors for variable Mylar thickness are determined by measuring aluminum K-alpha intensities transmitted by Mylar samples of interest, and calculating the correction factors directly. The aluminum K-alpha radiations originate from interchangeable aluminum standards. The correction factors for sulfur K-alpha and chlorine K-alpha are determined from the aluminum K-alpha factors and equations of the linear relationships mentioned. The maximum intensity ratios which have been noted for analysis of the same or identical samples against different Mylar films selected at random are: aluminum K-alpha -1.210, sulfur K-alpha -1.064, and chlorine K-alpha -1.038. (Author)

AD-402 315 Div. 14
(TISTE/JBM) OTS price $.50

Watertown Arsenal Labs., Mass.
DYNAMIC STRESS CONCENTRATION FACTORS.
Rept. on Basic Research in Physical Sciences,
by Richard Shea. Mar 63, 14p. incl. illus. 6 refs. (Technical rept. no. WAL TR 811.6/1)
(DA proj. 1-A-0-10501-B-010)
Unclassified report

DESCRIPTORS: *Sheets, *Plastics, Loading (Mechanics), Shear stresses, Theory, Models (Simulations), Test methods, Explosion effects, Test equipment, Configurations, Structual properties, Stresses.

The problem of the response of structural discontinuities to short duration stress pulses is studied experimentally. Employing explosively induced stress pulses in thin plastic plates containing central circular holes, a dynamic stress concentration factor is determined as a function of pulse frequency. It is concluded for this loading case that the dynamic stress contration is significantly lower than the static value. (Author)

AD-402 330 Div. 14
(TISTM/CCH) OTS price $3.60

Owens-Corning Fiberglas Corp., Newark, Ohio.
INVESTIGATION OF GLASS-METAL COMPOSITE MATERIALS.
Quarterly progress rept. no. 15, 15 Sep-15 Dec 59,
by P. A. Lockwood. 15 Dec 59, 27p. incl. illus. tables.
(Contract NOrd 15764)
Unclassified report

DESCRIPTORS: *Glass textiles, *High temperature research, *Composite materials, Metal coatings, Aluminum, Zirconium, Titanium, Statistical analysis, Tensile properties, Industrial research.

This report includes:
ON POISSON'S RATIO OF COMPOSITE MATERIALS,
by E. Saibel, and I. Tadjbakhsh. 8 Oct 59.

Study of high temperature glass fibers was made with considerable success and results of well known compositions in the SiO2-Al2O3-MgO ternary, the SiO2-Al2O3-CaO ternary, and the SiO2-Al2O3-MgO-CaO quaternary systems offered a fertile field for fibers with exceptional high-temperature strengths. Relying on glass forming knowledge gained in earlier studies, four glasses from the CaO ternary system were studied along with two glasses from the quaternary system and four glasses from the MgO ternary system. While most of the glasses studied showed an improvement in tensile strength both bare and aluminum-coated compared to ''E'' glass, X-994 in the MgO ternary system shows the most promise. The X-994 glass was formed at over 3100 F and had an average tensile strength in the uncoated condition of 635,000 psi and a tensile strength of 178,000 psi coated with aluminum, roughly 50,000 psi greater than the tensile strength of aluminum-coated ''E'' glass fibers. Other glasses from the three composition fields will be examined as they become available. (Author)

AD-402 394 Div. 14
(TISTM/AMS) OTS price $1.60

Bendix Products Div., Bendix Corp., South Bend, Ind.
STRENGTHENING OF CHROMIUM-MAGNESIA COMPOSITES.
Interim rept. no. 1, 29 Jan-31 Mar 63,
by G. C. Reed. 18 Apr 63, 9p. incl. tables, 4 refs.
(Contract N6001959647)
Unclassified report

DESCRIPTORS: *Composite materials, Chromium, Ceramic materials, Test methods, Magnesium compounds, Oxides, Tensile properties, Transition temperature, Impact shock, Manufacturing methods, Thorium compounds, Extrusion, Fracture (Mechanics), Ductility.

AD-402 420 Div. 14, 17
(TISTM/LMH) OTS price $10.10

Purdue U., Lafayette, Ind.
MATERIALS RESEARCH IN SCIENCE AND ENGINEERING AT PURDUE UNIVERSITY.
Annual rept. no. 1,.
1962, 123p.
Unclassified report

DESCRIPTORS: *Scientific research, *Materials, Molecular structure, Solids, Gases, Liquids, Mechanical properties, Optical properties, Transport properties, Structural properties, Thermodynamics, Microwaves, Crystal structure.

AD-402 459 Div. 14, 17
(TISTM/AMS) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
FIRST SEMINAR AT THE DEPARTMENT OF TECHNICAL SCIENCES OF THE ACADEMY OF SCIENCES UKr-SSR ON SURFACE DIFFUSION SATURATION OF METALS AND COATINGS OF HIGH MELTING COMPOUNDS ON METALLIC AND NONMETALLIC MATERIALS,
by O. P. Yepik, 25 Mar 63, 7p. (Trans. no. FTD-TT-62-1926 from Dopovidi Akademii Nauk Ukrainskoy RSR, no. 6, pp. 837-839, 1962)
Unclassified report

DESCRIPTORS: *Coatings, Thermal diffusion, Surface properties, Metals, Materials, Theory, Protective treatments, Manufacturing methods, Chemical compounds, Symposia.

15. MATHEMATICS

AD-401 032 Div. 15
(TISTP/WH) OTS price $1.60

Hebrew U. (Israel).
A MEASURE OF ASYMMETRY FOR PLANE CONVEX SETS,
by Branko Grunbaum. Nov 62, 12p. incl. illus. 6 refs. (Technical (Scientific) note no. 35)
(Contract AF 61(052)187)
(AFOSR 4585) Unclassified report

DESCRIPTORS: *Convex sets, Asymmetric bodies.

A functional related to the notion of sixpartite points is defined for convex bodies in the plane. Its extreme values are determined and it is proved that the functional is a measure of asymmetry. (Author)

AD-401 140 Div. 15
(TISTP/GRW) OTS price $3.60

University of Wisconsin, Madison.
TWO APPLICATIONS OF CHAIN SEQUENCES TO UNIVALENCE,
by T. L. Hayden and E. P. Merkes, 36p. 18 refs.
(MRC Technical Summary rept. 378)
(Contract DA-11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Sequences, *Functions, Continued freactions, Bessel functions, Taylor's series.

By a reformulation of some classical results on chain sequences, necessary and sufficient conditions are obtained for each function. In addition, estimates of the starlike radius of the functions F(z) are found. The second application relates chain sequences to the radii of univalence and of starlikeness of a class of functions f(z) where the ratio zf'(z)/f(z) has a certain type of C-fraction expansion. As an illustration of the result, the question of univalence and starlikeness of suitably normalized Bessel functions is considered. (Author)

AD-401 148 Div. 15, 8
(TISTP/MC) OTS price $11.00

Carlyle Barton Lab., Johns Hopkins U., Baltimore, Md.
ZERO-CROSSING INTERVALS OF RANDOM PROCESSES,
by A. J. Rainal. Apr 63, 149p. incl. illus. 41 refs. (Technical rept. no. AF-102)
(Contract AF 33(657)11029; Continuation of Contract AF 33(616)6753)
Unclassified report

DESCRIPTORS: *Communication theory, *Probability, Correlation coefficients.

A digital system for studying the zero-crossing intervals of random processes is described. Probabilities and probability densities defined by the zero-crossing points of various Gaussian processes are presented. Probabilities and probability densities defined by the zero-crossing points of a random process consisting of a sine wave plus a Gaussian process are also presented. Finally, probabilities and probability densities defined by the stationary points of a random process consisting of a sine wave plus a Gaussian process are presented. At present none of the probabilities or probability densities can be derived explicitly by analytical methods. The standard deviations associated with the probability densities are also presented. In the case of the Gaussian processes the correlation coefficients for two successive intervals

are presented. The first moments associated with the probability densities are compared with the exact theoretical values. All the other experimental results are compared with theoretical approximations. The statistical dependence between the ith zero-crossing interval and the (i+m)th zero-crossing interval is investigated. (Author)

AD-401 186 Div. 15
(TISTP/FEM) OTS price $2.60

Mathematics Research Center, U. of Wisconsin, Madison.
ON THE APPROXIMATE SOLUTION OF DELTA u=F(u),
by D. Greenspan and M. Yohe. Mar 63, 24p. incl. illus. tables, 15 refs. (MRC Technical summary report no. 384)
(Contract DA-11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Difference equations, *Potential theory, Algebras, Partial differential equations, Functions, Linear systems, Vector analysis, Differential equations, Programming (Computers), Numerical analysis.

Three dimensional Dirichlet problems for DELTA u = F(u), F sub u > or = 0, are treated numerically by an exceptionally fast, exceptionally accurate numerical method. Programming details, numerous examples, and mathematical theory are supplied. Extension of the method in a natural way to n-dimensional problems is indicated by means of a 4-dimensional example. (Author)

AD-401 209 Div. 15
(TISTP/MB) OTS price $7.60

California U., Berkeley.
BOUNDARY-VALUE PROBLEMS FOR THE MAXWELL'S EQUATIONS,
by Kane Yee. Mar 63, 1v. 21 refs. (Technical rept. no. 12)
(Contract Nonr 222(60))
Unclassified report

DESCRIPTORS: *Electromagnetic fields, Electromagnetism, Electric fields, Magnetic fields, Partial differential equations.

This report contains the proofs of the uniqueness and existence theorems for an electromagnetic field when the normal component of both the electric and magnetic fields are given on a smooth surface. The results are obtained for an exterior domain. However, the same method can be used for the interior problems. Whereas one synthesizes an electromagnetic field by a surface current when either the tangential electric or magnetic field is given, we synthesize our electromagnetic field by means of the electric and magnetic surface charges. (Author)

AD-401 217 Div. 15
(TISTP/MB) OTS price $2.60

Mathematics Research Center, U. of Wisconsin, Madison.
APPROXIMATION AND ALLOCATION,
by Arthur Wouk. Feb 63, 15p. 4 refs. (MRC Technical summary rept. no. 382)
(Contract DA -11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Mathematical logic, *Curve fitting, Numerical analysis.

The segmented approximation problem is that of finding, for a given function x, a set of n functions, y sub i, in some collection such that the supports of the y sub i are pairwise disjoint while some functional of x-y sub 1 - ... -y sub n is minimized. The recursive functional equation for the 'error' as a function of the set on which approximation occurs is derived from weak conditions on the functional. The allocation of the reduction in 'error' attributable to each of the y sub i is studied and the hereditary nature of an equal allocation principle is established. (Author)

AD-401 218 Div. 15, 16
(TISTP/MB) OTS price $3.60

Mathematics Research Center, U. of Wisconsin, Madison.
SOME FAMILIES OF COMPOUND AND GENERALIZED DISTRIBUTIONS,
by John Gurland. Feb 63, 29p. incl. tables, 28 refs. (MRC Technical summary rept. no. 380)
(Contract DA-11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Statistical distributions, *Biology, Curve fitting, Statistical processes, Statistical analysis.

Compound and generalized distributions have been discussed in the framework of contagious distributions. In particular, it is pointed out that the Negative Binomial may be regarded as a compound Poisson (using a Gamma variable as the compounder) or as a generalized Poisson (using a Logarithmic random variable as the generalizer). As an example of true contagion, the Negative Binomial is also a limit of the distribution obtained through Polya's urn model. A formal relation between compound and generalized distributions is developed, utilizing a symbolic notation. Some natural extensions of the Negative Binomial through repeated compounding with a Gamma distribution or through repeated generalizing with a Logarithmic distribution are indicated. (Author)

AD-401 222 Div. 15
(TISTP/MB) OTS price $1.60

RAND Corp., Santa Monica, Calif.
A UNIQUENESS CONDITION FOR NONTRIVIAL PERIODIC SOLUTIONS TO THE LIENARD EQUATION,
by T. A. Brown. Apr 63, 9p. incl. illus. 5 refs. (Memo. no. RM-3570-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Differential equations, *Nonlinear differential equations, Nonlinear systems.

This Memorandum presents a new condition which implies that the differential equation

$$\ddot{x} + f(x)\dot{x} + q(x)x = 0$$

has an essentially unique non-trivial periodic solution, to which all other solutions tend as $t \longrightarrow \infty$. (Author)

AD-401 392 Div. 15
(TISTP/GRW) OTS price $3.60

RAND Corp., Santa Monica, Calif.
ON THE NONLINEAR DIFFERENCE-DIFFERENTIAL

EQUATION x(t).= g1(x(t))g2(X(t-1)),
by Thomas A. Brown. Apr 63, 25p. incl. table, 7 refs. (Memo. no. RM-3540-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Non-linear differential equations, *Difference equations, Control systems, Functions.

AD-401 543 Div. 15
(TISTP/WH) OTS price $1.60

Mathematics Research Center, U. of Wisconsin, Madison.
THE HEURISTICS OF DATA TRANSFORMATION,
by H. E. Reinhardt. Feb 63, 15p. 9 refs.
(MRC technical summary rept. no. 355)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Analysis of variance, *Probability, *Statistical functions, *Transformations (Mathematics).

AD-401 545 Div. 15
(TISTP/WH) OTS price $2.60

Mathematics Research Center, U. of Wisconsin, Madison.
ON CONTINUED FRACTION EXPANSIONS FOR BINOMIAL QUADRATIC SURDS -- COMPUTATION ON COMPUTERS,
by E. Frank. Mar 63, 21p. incl. illus. tables, 3 refs. (MRC technical summary rept. no. 363)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Binomials, *Series, *Digital computers, Programming computers.

AD-401 549 Div. 15
(TISTP/TL) OTS price $1.60

California U., Los Angeles.
A CHARACTERIZATION OF THE EXPONENTIAL DISTRIBUTION,
by Thomas S. Ferguson. Mar 63, 17p. 6 refs.
(Working paper no. 31)
(Contract Nonr-23373, Proj. NR 047 041)
Unclassified report

DESCRIPTORS: *Statistical distributions, *Measure theory, *Probability, Geometry, Analysis of variance, Real variables, Integrals.

AD-401 589 Div. 15
(TISTP/FEM) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CERTAIN PROBLEMS OF THE THEORY OF STATISTICAL LINEARIZATION AND ITS APPLICATION,
by I. Ye. Kazakov. 27 Feb 63, 28p. incl. illus. 3 refs. (Trans. no. FTD-TT-62-1385 from Trudy I mezhdunarodnogo kongressa mezhdunarodnoy federachii po avtomaticheskomu upravleniyu. Statisticheskiye metody issledovaniya. Teoriya struktur, modelironvaniye, terminologiya, obrazovaniye. Moscow, Izd-vo AN SSSR, pp. 68-83, 1961)
Unclassified report

DESCRIPTORS: *Statistical functions, *Statistical analysis, Probability, Transformations (Mathematics), Functions, Differential equations, Integral equations, Nonlinear systems, Control systems.

The theory of statistical linearization based on the approximation of an arbitrary nonlinear transformation of a random function by an equivalent linear operator is reviewed. Applications of this theory to an analysis of the accuracy of nonlinear automatic control systems are given. Practical methods of determining the equivalent operator for a nonlinear transformation of random functions are recommended. (Author)

AD-401 593 Div. 15, 25
(TISTP/FEM) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
MATHEMATICAL PROBLEMS IN CREATING A DIGITAL GRID ANALYZER,
by M. A. Aleksidze. 27 Mar 63, 29p. incl. illus. tables, 16 refs. (Trans. no. FTD-TT-62-1823 from Russian Book, Trudy Vychislitel'nogo Tsentra, Akademiya Nauk Gruzinskoy SSR, vo. 1, pp. 263-282, 1960)
Unclassified report

DESCRIPTORS: *Mathematical analysis, Digital computers, Analysis, Difference equations, Green's functions, Inequalities, Data storage systems.

The desirability, from the viewpoint of machine time, of using various iteration processes in specialized digital computers due to lack of storage space is investigated. The parallel processing proposed earlier for all columns (rows), while substantially enlarging the apparatus, yields almost no advantage with the most expedient iteration process, the superrelaxation process. (Author)

AD-401 642 Div. 15
(TISTP/MC) OTS price $5.60

RAND Corp., Santa Monica, Calif.
SOME THOUGHTS ON THE THEORY OF COOPERATIVE GAMES,
by Gerd Jentzsch, ed. by R. J. Aumann. Apr 63, 51p. incl. illus. 6 refs. (Memo. no. RM-3398-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Operations research, *Game theory, Convex sets.

This work is the result of an attempt to generalize the von Neumann-Morgenstern theory of n-person games by eliminating the requirement that the utility functions be linear, or more generally, by eliminating side payments altogether. It is known that unless suitable restrictions are imposed, the minimax theorem for coalitions will not hold: outcomes will exist which can neither be guaranteed by a coalition nor prevented by the opposing coalition. Jentzsch addresses himself to the task of broadening the class of games considered by von Neumann and Morgenstern while retaining the minimax property for coalitions. His chief result may be described (for games with side payments) by saying that each coalition must have a kind of "social utility function" for money. (Author)

AD-401 668 Div. 15
(TISTP/WH) OTS price $8.60

Naval Weapons Lab., Dahlgren, Va.
TABLE OF EXPECTATIONS OF MEAN SQUARES IN THE ANALYSIS OF VARIANCE FOR CROSSED CLASSIFICATIONS,
by Klaus Abt. 18 Oct 62, 1v. 19 refs. (NWL rept. no. 1833)
Unclassified report

DESCRIPTORS: *Analysis of variance, *Statistical analysis, Tables.

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The expectations of mean squares in the analysis of variance for crossed classifications are tabulated. In an appendix the method is outlined which was used to obtain the mean square expectations. The table covers the two-way, the three-way and the four-way classification with unequal but proportional as well as with equal cell numbers. The mean square expectations (and the appropriate variance ratios for testing all nullhypotheses) are listed for all possible combinations of fixed and random effects classifications. Also, rules are given for generating the mean square expectations for all situations in the general case of an n-way crossed classification. (Author)

AD-401 722 Div. 15
(TISTP/FR) OTS price $1.60

Naval Missile Center, Point Mugu, Calif.
A GENERALIZED ERROR FUNCTION IN n DIMENSIONS,
by M. Brown. 12 Apr 63, 11p. incl. illus.
(Technical memo. no. NMC-TM-63-8)
Unclassified report

DESCRIPTORS: *Functions, Errors, Probability.

The error function, which occurs, in much of the literature of mathematics, physics, and engineering, is generalized to handle the normal probability distribution in n dimensions. Explicit integral representations for these functions are found to be of two general forms, depending upon whether n is even or odd. Some readily established recursion formulas and other relationships are derived for these functions. (Author)

AD-401 803 Div. 15
(TISTP/FEM) OTS price $1.60

Columbia U., New York.
COMBINATORIAL METHODS IN THE THEORY OF DAMS,
by Lajos Takacs. 25 Mar 63, 15p. 16 refs.
(Rept. no. CU-36-63)
(Contract Nonr-26659, Proj. NR 042-205)
Unclassified report

DESCRIPTORS: *Combinatorial analysis, *Dams, Statistical distributions, Mathematical models, Simulation, Equations, Statistical processes, Mathematical analysis.

Two mathematical models of infinite dams are discussed. In the first model independent random inputs occur at regular time intervals and in the second model independent random inputs occur in accordance with a Poisson process. For both models we shall find explicit formulas for the distribution of the content of the dam and that of the lengths of the wet periods and dry periods. The proofs are elementary and based on two generalizations of the classical ballot theorem. (Author)

AD-401 848 Div. 15
(TISTP/MC) OTS price $1.10

Columbia U., New York.
SOME INEQUALITIES ON CHARACTERISTIC ROOTS OF MATRICES,
by T. W. Anderson and S. Das Gupta. 1 Apr 63, 8p. 2 refs. (Rept. no. CU-65-63)
(Contract Nonr-26633, Proj. NR 042-034)
Unclassified report

DESCRIPTORS: *Matrix algebra, Statistical distribution, Multivariate analysis, Inequalities.

Some inequalities on the characteristic roots of positive definite matrices and of matrices derived from them are obtained. Some of these are generalizations of results of Roy (1954) which give upper and lower bounds on all the roots of the product of two positive definite matrices in terms of the maximum and the minimum roots of the factor matrices. These various results are found to be useful in the study of statistical problems concerning the normal multivariate distribution, and the authors hope that they might be useful in other mathematical statistics investigations also. (Author)

AD-401 905 Div. 15
(TISTP/FEM) OTS price $2.60

Mathematics Research Center, U. of Wisconsin, Madison.
DIVISION IN ALGEBRAS OF INFINITELY DIFFERENTIABLE FUNCTIONS,
by Walter Rudin. Nov 61, 22p. 7 refs. (MRC technical summary rept. no. 273)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Algebras, Differential equations, Inequalities, Numerical analysis, Sequences, Functions.

AD-401 906 Div. 15
(TISTP/FEM) OTS price $1.60

Mathematics Research Center, U. of Wisconsin, Madison.
ON A DIFFERENCE-INTEGRAL EQUATION. PART II. LAPLACE TRANSFORM TREATMENT,
by P. M. Anselone and H. F. Bueckner. Jan 62, 14p. 9 refs. (MRC technical summary rept. no. 268)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Difference equations, *Integral equations, Functions, Real variables, Inequalities, Functional analysis, Integral transforms.

The difference-integral equation is treated with the aid of the Laplace transform. Since we shall make no smoothness assumptions such as local bounded variation, we cannot apply directly the complex inversion formula for the Laplace transform. Nevertheless, we manage to get much the same results which a standard approach yields under suitable smoothness conditions. (Author)

AD-401 924 Div. 15, 8, 30
(TISTP/FEM) OTS price $3.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
STUDY ON APPLICATION OF CODING THEORY.
Semi-annual rept. no. 5, 1 July-30 Dec 62,
by A. E. Laemmel. 15 Feb 63, 34p. incl. illus. 18 refs. (Rept. no. PIBMRI-895.5-63)
(Contract DA 36-039-sc-78972, Proj. 3A99-20-001-07)
Unclassified report

DESCRIPTORS: *Communication theory, *Mathematical logic, Measure theory, Digital systems, Computers, Sequences, Matrix algebra, Data storage systems, Coding.

Several miscellaneous results are given in the theory of digital codes and finite state machines. Of particular interest in either case is the problem of ergodicity, i. e. whether a machine (which may be a decoder) can be reset to the correct state with the proper input sequence and with no knowledge of the present states or outputs. Some of the results given are algebraic methods and other tools useful in examining ergodicity and related problems. Consideration is also given to the synthesis of sequential machines to economically solve tasks which are essentially non-sequential. (Author)

AD-401 935 Div. 15
(TISTP/FEM) OTS price $6.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
SYNTHESIS OF INTEGRAL MINIMAL WEIGHTS.
Technical rept.,
by Sze-Tsen Hu. Mar 63, 1v. incl. tables, 21 refs. (Rept. no. LMSC-6-90-63-35)
Unclassified report

DESCRIPTORS: *Mathematical analysis, *Linear programming, Functions, Synthesis, Statistical analysis, Numerical analysis, Numbers, Sequences, Inequalities, Matrix algebra, Integrals.

An effective and mathematically rigorous finite process for determining whether or not a given regular switching function is linearly separable, and if it is, for deriving a minimal set of integral weights and threshold to realize the function is described. The procedure uses integral linear programming recently developed; the algorithm is described in detail, and a corresponding computer program for implementing the technique can be obviously given without difficulty. As an illustrative example, a regular switching function of nine variables is worked in detail. (Author)

AD-402 014 Div. 15
(TISTP/FEM) OTS price $4.60

Lockheed Aircraft Corp., Sunnyvale Calif.
THE DUAL SIMPLEX METHOD AND ITS APPLICATION TO THE SYNTHESIS OF MINIMAL WEIGHTS.
Technical rept. no. Mathematics,
by Sze-Tsen Hu. Nov 62, 1v. incl. tables, 18 refs. (Rept. no. 6-90-62-118)
Unclassified report

DESCRIPTORS: *Linear programming, *Mathematical analysis, Functions, Synthesis, Matrix algebra, Inequalities, Algebras, Equations, Numbers.

An algorithm for applying the dual simplex method in linear programming to the problem of determining whether or not a given switching function is linearly separable is described. Where separability is possible a description is given of the application of the dual simplex method to finding the most economic system of weights and threshold. A detailed elementary exposition of the dual simplex method is given and a completely worked out illustrative numerical example is presented. The dual simplex method is applied to the problem of determining minimal weights and threshold and a numerical example is given. (Author)

AD-402 064 Div. 15
(TISTP/MC) OTS price $5.60

Operations Research Center, U. of Calif., Berkeley.
MARKOV-RENEWAL PROGRAMMING,
by William S. Jewell. 23 Oct 62, 54p. incl. illus. (Research rept. no. 37; I.E.R. 172-46)
(Contract Nonr-22283)
Unclassified report

DESCRIPTORS: *Decision making, *Probability, *Operations research, Linear programming, Statistical analysis.

A special structure in dynamic programming which has been studied by a number of investigators is the problem of programming over a Markov chain. This paper extends their results and solution algorithms to programming over a Markov - renewal process - in which times between transitions of the system from state i to state j are independent samples from an inter-transition distribution which may depend on both i and j. For these processes, a general reward structure and a decision mechanism are postulated; the problem is to make decisions at each transition to maximize the total expected reward at the end of the planning horizon. (Author)

AD-402 087 Div. 15
(TISTP/MC) OTS price $3.60

Carnegie Inst. of Tech. Graduate School of Industrial Administration, Pittsburgh, Pa.
A HEURISTIC APPROACH TO SOLVING TRAVELLING SALESMAN PROBLEMS,
by Robert L. Karg and Gerald L. Thompson.
5 Jan 63, 18p. illus. tables, 6 refs. (ONR Research memo. no. 107)
(Contract Nonr 760(01), Proj. NR 047011)
Unclassified report

DESCRIPTORS: *Mathematics, *Operations research, Computers, Programming (Computers).

A discussion is given of a method, suitable for electronic computers, that has proved capable of quickly obtaining solutions for problems having about 60 cities or less in symmetric and some nonsymmetric problems. In principle the method can be used for any size problem. Although the code does not guarantee finding the optimum tour, it can be used over and over several times and in various ways to get a probabilistic idea of how good the best answer found is relative to the set of observed answers. (Author)

AD-402 288 Div. 15
(TISTP/WH) OTS price $5.60

RAND Corp., Santa Monica, Calif.
NONLINEAR INTEGRAL EQUATIONS OF RADIATIVE TRANSFER,
by Thomas W. Mullikin. Apr 63, 50p. 80 refs.
(Rept. no. P-2736)
Unclassified report

DESCRIPTORS: *Integral equations, *Series, *Electromagnetic waves, *Mathematical models, Atmosphere, Scattering, Intensity, Wave transmission, Propagation.

The mathematical model of certain radiative transfer problems employs both linear and nonlinear equations which determine desired functions. As opposed to the usual situation, the linear equations are exact and not merely linear approximations to the nonlinear equations. This fortunate situation permits obtaining many exact results about the nonlinear equations by a study of the linear equations. A relatively simple problem in the theory of radiative transfer is discussed: that of determining quantitatively the intensity of radiation (neglecting polarization and redistribution of absorbed radiation) in a homogeneous, plane-parallel atmosphere that is of finite thickness and infinite lateral extent, and that is exposed to monochromatic radiation impinging on one side of the atmosphere from a given direction. This also describes the transport of monoenergetic neutrons in a subcritical slab reactor. (Author)

Division 15 - MATHEMATICS

AD-402 290 Div. 15
(TISTP/WH) OTS price $7.60

Electronics Research Lab., U. of Calif., Berkeley.
OPTIMAL GAMBLING SYSTEMS FOR FAVORABLE GAMES,
by L. Breiman. 13 Aug 62, 14p. incl. illus. 8 refs. (Institute of Engineering Research, Series no. 60, Issue no. 467)
(Contract Nonr-22253)
Unclassified report

DESCRIPTORS: *Game theory, *Probability, *Sequential analysis.

AD-402 320 Div. 15
(TISTP/TL) OTS price $1.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
FOSTER'S MARKOV CHAIN THEOREMS IN CONTINUOUS TIME,
by Rupert G. Miller, Jr. 19 Apr 63, 11p. 10 refs. (Technical rept. no. 88)
(Contract Nonr 22552, Proj. NR 342-022)
Unclassified report

DESCRIPTORS: *Probability, *Matrix algebra, *Statistical processes, Queueing theory, Inequalities.

AD-402 373 Div. 15
(TISTP/RD) OTS price $6.00

Rocketdyne, Canoga Park, Calif.
NEW TABLES OF THE NONCENTRAL T DISTRIBUTION.
Rept. on Mathematical Techniques of Aerodynamics,
by M. O. Locks, M. J. Alexander, and B. J. Byars. Jan 63, 463p. incl. tables, 10 refs.
(Contract AF 33(616)7372, Proj. 7071)
(ARL 63-19) Unclassified report

DESCRIPTORS: *Statistical distributions, *Tables.

This monograph presents new tables of the probability densities and cumulative probabilities of the noncentral t distribution. These tabulations differ from existing ones primarily in the treatment of the range of values for the noncentrality parameter. The distribution functions are given in two different sets of tables: (1) the probability integrals (cumulative probabilities associated with many values of the noncentral t statistic), and (2) percentage points (values of t associated with relatively few fixed probability levels). (Author).

AD-402 400 Div. 15, 11, 33
(TISTW/JEA) OTS price $1.60

Electronics Research Lab., U. of Calif. Berkeley.
THE POISSON TENDENCY IN TRAFFIC DISTRIBUTION,
by L. Breiman. 22 Aug 62, 9p. 4 refs. (Series no. 60, Issue no. 473)
(Contract Nonr-22253)
Unclassified report

DESCRIPTORS: *Statistical processes, *Trafficability, Statistical functions, Theory, Probability, Sequences, Traffic.

The purpose of this note is to show that in a strong sense the Poisson distribution is the only initial distribution leading to a stable traffic flow. The main result is that for a wide class of initial distributions, the passage of time brings a convergence to the Poisson distribution. (Author)

AD-402 401 Div. 15
(TISTW/JEA) OTS price $1.10

Electronics Research Lab. U. of Calif., Berkelev
DISCRETE DYNAMIC PROGRAMMING,
by D. Blackwell. 13 Aug 62, 8p. 5 refs.
(Series no. 60, Issue no. 468)
(Contract Nonr-22253)
Unclassified report

Reprint from the Annals of Mathematical Statistics, 33:2, pp. 719-726, June 62.

DESCRIPTORS: *Statistical processes, Statistical functions, Sequences, Transformation (Mathematics), Vector analysis, Matrix algebras, Operators (Mathematics), Inequality, Numerical methods and procedures.

We consider a system with a finite number S of states s, labeled by the integers 1, 2, ···, S. Periodically, say once a day, we observe the current state of the system, and then choose an action, a, from a finite set, A, of possible actions. As a joint result of the current state, s, and the chosen action, a, two things happen: (1) we receive an immediate income i(s, a) and (2) the system moves to a new state s' with the probability of a particular new state s' given by a function $q = q(s' \mid s, a)$. Finally there is specified a discount factor β, $0 \leq \beta < 1$, so that the value of unit income n days in the future is β^n. Our problem is to choose a policy which maximizes our total expected income. This problem, which is an interesting special case of the general dynamic programming problem, has been solved by Howard in his excellent book. The case $\beta = 1$, also studied by Howard, is substantially more difficult. We shall obtain in this case results slightly beyond those of Howard, though still not complete. Our method, which treats $\beta = 1$ as a limiting case of $\beta < 1$, seems rather simpler than Howard's. (Author)

AD-402 403 Div. 15, 26
(TISTW/JEA) OTS price $1.60

Electronics Research Lab., U. of Calif. Berkeley.
A MODEL FOR QUALITY CONTROL,
by L. Breiman. 1 Oct 62, 16p. 5 refs. (Series no. 60, Issue no. 438)
(Contract Nonr-22253)
Unclassified report

DESCRIPTORS: *Quality control, Machines, Manufacturing methods, Acceptability, Production, Reduction, Statistical processes, Analysis of variance, Numerical analysis, Maintenance, Models (Simulators), Probability.

Our purpose is to introduce a model for quality control, and to characterize a policy which maximizes the given payoff function. Envisage a machine with two internal states, 0 and 1. Starting at state 0 at time zero, it manufactures an item which is either defective or non-defective and then in unit time, either remains in state 0 or goes to state 1. State 1 is an absorbing state. After every transition the machine manufactures another item. There are different probabilities of the item being defective or non-defective according as the state of the machine. After any number of items have been turned out, the machine may be stopped for an integer time T, and when this repair period T is over it is in state 0 and the manufacturing process begins again. (Author)

AD-402 466 · Div. 15
(TISTP/RD) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
APPLICATION OF THEORY OF OPTIMAL PROCESSES TO FUNCTION APPROXIMATION PROBLEMS,
by V. G. Boltyanskiy. 25 Mar 63, 20p. incl. illus. 9 refs. (Trans. no. FTD-TT-63-152 from Trudy, Matematicheskogo Instituta Akademii Nauk SSSR, No. 60, Izdatel'stvo Akademii Nauk SSSR, Moskva, pp. 82-95, 1961)
Unclassified report

DESCRIPTORS: *Algebraic topology, *Convex sets, *Special functions (Mathematical), *Least squares method, *Taylor's series, *Sequences, *Numerical analysis, *Inequalities.

AD-402 496 Div. 15, 20
(TISTP/PCR) OTS price $2.60

RAND Corp., Santa Monica, Calif.
SINGULAR SOLUTIONS OF AN INTEGRO-DIFFERENTIAL EQUATION IN RADIATIVE TRANSFER,
by T. W. Mullikin. Apr 63, 19p. 5 refs.
(Memo. no. RM-3575-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Integral equations, *Differential equations, *Radiation effects, Scattering, Reflection, Nonlinear differential equations, Thickness, Mathematical prediction, Mathematical analysis.

In the theory of radiative transfer in a homogeneous isotropic slab of thickness, T, the scattering (reflection) function can be determined by a nonlinear integro-differential equation and initial conditions. For a numerical analysis of this equation it is often important to know the behaviour of solutions in the vicinity of the desired solution. A set of initial conditions for which the solutions to the nonlinear integro-differential equation are infinite for finite values of the parameter, T, are presented. Some of these singular solutions first come close to the desired solution and then diverge to infinity. The nearness of approach of these singular solutions is proportional to a quantity which measures the nearness of local scattering to the conservative case. The conservative case is again found by a continuous passage from nonconservative to conservative scattering. (Author)

16. MEDICAL SCIENCES

AD-401 027 Div. 16, 20
(TISTB/CCH) OTS price $1.60

Naval Radiological Defense Lab., San Francisco, Calif.
MOTOR RESPONSES IN MOTHS TO LOW INTENSITY X-RAY EXPOSURE,
by J. C. Smith, D. J. Kimeldorf and E. L. Hunt. 25 Feb 63, 12p. incl. illus. 9 refs. (Rept. no. NRDL-TR-622)
Unclassified report

DESCRIPTORS: *X-rays, *Radiobiology, *Insects, Brain, Spinal cord, Flight, Wings, Motor reactions, Intensity, Radiation effects, Lepidoptera.

A brief burst of x-rays elicited flight activity in the moth when placed in a darkened x-ray exposure room. Wing-beat activity was recorded as an index of this behavior. Wing-beat activity could be initiated in resting moths or amplitude-augmented in active moths by x-ray dose rates of 0.01 - 1.5r/sec with a latency of less than one second after onset of exposure. (Author)

AD-401 145 Div. 16
(TISTM/WA) OTS price $1.10

Pasadena Foundation for Medical Research, Calif.
RADIOPROTECTIVE AGENTS: THE EFFECTS OF DEPOLYMERIZED YEAST RIBONUCLEIC ACID ON RADIATED HUMAN CELLS IN TISSUE CULTURE,
by Donald E. Rounds and William C. Slick.
Oct 62, 4p. incl. tables, 8 refs.
(Contract AF 41(657)337, Proj. 7757)
(SAM TDR-62-85) Unclassified report

DESCRIPTORS: *Radioprotective agents, *Ribonucleic acid, *Tissue culture, *Gamma rays, *Radiation effect, Toxicity, Polymerization, Cells (Biology), Growth, Yeast, Life span.

Yeast ribonucleic acid was hydrolyzed with NaOH to produce polynucleotide mixtures which were tested for radioprotective activity on cultured cells. The depolymerized RNA stimulated the growth rate of amnion cells during 5-day treatment periods, but had no effects on growth when the cells were treated for a 24-hour period. A 24-hour treatment of amnion cells with the nucleotide mixture prior to 700-r gamma radiation resulted in an increase in the surviving cell populations. This effect appeared to reach a maximum with a polynucleotide concentration of 0.3 mg./ml. The RNA hydrolysate had no significant effect on radiated KB cells, but surviving HeLa and amnion cell populations were increased by 19% and 63%, respectively, over controls. This radioprotective response was detected after a minimum of 4 hours of treatment of amnion cells with the test material. (Author)

AD-401 205 Div. 16
(TISTM/LMH) OTS price $1.10

Mississippi U., School of Medicine, Jackson.
PHARMACOLOGICAL STUDY ON CENTRAL SYNAPTIC SYSTEMS AFFECTING MOTOR FUNCTION,
Annual progress rept., 15 Mar 62-14 Mar 63,
by James D. Martindale and William C. Holland.
8 Apr 63, 3p. illus.
(Contract DA 18-108-405-cml-749)
Unclassified report

DESCRIPTORS: *Pharmacology, Muscle relaxants, Laboratory animals, Food, Eye, Respiration, Drugs, Cats, Nervous system.

AD-401 215 Div. 16
(TISTM/CCH) OTS price $1.50

Naval Civil Engineering Lab., Port Hueneme, Calif.
HARBOR SCREENING TESTS OF MARINE BORER INHIBITORS - V,
by H. Hochman and T. Roe, Jr. 22 Feb 63, 52p. incl. illus. tables, 12 refs. (Technical rept. no. R236)
(Proj. Y-R005-07-007) Unclassified report

DESCRIPTORS: *Marine borers, *Wood, *Organic coatings, Creosote, Inorganic compounds, Coatings, Copper compounds, Tables, Trees, Inhibition, Contamination.

The Laboratory is exposing wood panels impregnated with various materials to determine their resistance to attack by marine borers. When impregnated into wood test panels, creosote

and 70-30 creosote - coal tar solution are effective against Martesia and teredine attack but not Limnoria attack. Copper salts, chelates, some copper complexes and mercury salts are effective against Limnoria attack at Port Hueneme and Pearl Harbor but are ineffective against teredine and Martesia attack. Tributyltin compounds are effective against Limnoria and teredine borers at Port Hueneme but have shown attack by Limnoria at Pearl Harbor. However, at Pearl Harbor they are effective against Martesia and teredine borers. Copper naphthenate and solubilized copper oxinate are superior to creosote or creosote coal tar. Certain organic, metal organic, and inorganic compounds, when combined with creosote or creosote coal tar, show promise in improving the preservative ability of these materials. Aluminum oxinate, malachite green oxalate, and zinc naphthenate are not effective additives. Treatments with a combination of one material specifically toxic to Limnoria and another material specifically toxic to teredine borers are also showing promise as preservative systems, except that some have experienced Martesia attack.

AD-401 353 Div. 16
(TISTM/AAR) OTS price $1.10

Miami U., Coral Gables Fla., School of Medicine.
MOUSE CARCINOGENICITY STUDY.
Progress rept., 1 Mar 57-15 Sep 62,
by William B. Deichmann. 15 Sep 62, 4p. incl. table.
(Contract DA-49-007-md-789)
Unclassified report

DESCRIPTORS: *Mice, *Radiation effects, *Food, Neoplasms (Physiology), Vegetable, Fruits, Meat (Food), Fishes (Animals), Diet, Purification.

A study was made of the carcinogenic properties of foods sterilized by irradiation. The foods used in this experiment were tuna, sweet potatoes, fruit compote, beef and corn. The mixture of irradiated foods was fed to several different strains of mice. Up to the present time no indications of a significant increase in tumor incidence which could be ascribed to the feeding of the irradiated food has been observed (Author)

AD-401 360 Div. 16, 20
(TISTM/WA) OTS price $5.60

California U., Berkeley, Coll. of Engineering and School of Public Health.
RADIOLOGICAL DECONTAMINATION OF DRINKING WATER BY ION EXCHANGE,
by Gerhard Klein, Philip Harten, and Warren J. Kaufman. Nov 62, 51p. incl. illus. tables, 36 refs.
(Contract CDM-SR-60-58)
Unclassified report

DESCRIPTORS: *Decontamination, *Ion exchange, Radiological contamination, Radioactive isotopes, Yttrium, Barium, Lanthanum, Water softeners, Ion exchange resins, Mathematical analysis, Theory, Tables, Water, Decontamination.

The experimental work described herein was limited to the radioisotopes Y91 and Ba140-La140. On the basis of these studies, the following conclusions were made. Both Y91 and La140 showed a tendency to form anionic aggregates, probably with the hydroxyl ion functioning as a complexing agent or ligand. The mixed-bed resin systems have clearly superior decontaminating capabilities in comparison to the cationic mono-bed systems. Better decontamination was obtained with acid waters (pH 4 to 6) than with neutral or slightly alkaline waters (pH 7 to 7.5). The natural exchanger greensand was superior to the strongly acidic sulfonated polystyrene resin for the removal of Y91, Ba140, and La140. The slurrying of exchange materials with radioactive solutions containing mono or divalent ions was suitable for the study of ion exchange relationships, but has little practical decontamination value. The use of slurries with the rare earth radioisotopes appears to have little value as a means of screening ion-exchange materials to ascertain their decontamination capabilities. (Author)

AD-401 541 Div. 16, 20
(TISTM/CCH) OTS price $1.60

Naval Radiological Defense Lab., San Francisco, Calif.
DIFFERENTIAL EFFECTS OF SPECIFIC ANTISERA ON THE REJECTION OF ALLOGENIC AND XENOGENIC SKIN GRAFTS BY SUBLETHALLY X-IRRADIATED MICE,
by M. L. Tyan and L. J. Cole. 4 Mar 63, 16p. incl. tables, 14 refs. (Rept. no. NRDL-TR-625)
(Proj. MR005.08-5200)
Unclassified report

DESCRIPTORS: *Radiation effects, *Skin, *Transplantations, Neoplasms, Tissue (Biology), Immunology, Survival.

Twelve- to fourteen-week-old female LAF1 mice, non-sensitized or pre-sensitized with two consecutive BALB/c or rat skin grafts, received 670 rad whole body X radiation and orthotopic tail grafts of LAF1, BALB/c, C3D/2 and rat skin. Certain groups of mice received specific antisera intraperitoneally, produced in response to BALB/c or rat spleen cells or to two consecutive BALB/c or rat skin grafts. The data indicate that the first-set response to a allogenic skin graft can be significantly inhibited, in sublethally irradiated mice, by specific antisera, while the first-set response to a xenogenic skin graft remains resistant to similar treatment. Specific antisera had no effect upon a pre-existing second-set response. The significance of these data is discussed. (Author)

AD-401 647 Div. 16, 20
(TISTM/CCH) OTS price $2.60

Naval Radiological Defense Lab., San Francisco, Calif.
A DISPERSER FOR DEPOSITING SIMULATED DRY FALLOUT MATERIAL ON LARGE ROOF SURFACES,
by W. S. Kehrer. 13 Dec 62, 23p. incl. illus. tables (Rept. no. USNRDL-TR-609)
Unclassified report

DESCRIPTORS: *Aerosol generator, *Atmospheric pollution, Handling, Spray nozzle, Design, Simulation.

A disperser was designed and constructed to disperse simulated dry fallout (graded sand) for roof washdown effectiveness tests continuously and uniformly over a 48 x 72-ft test area at a controllable dispersal rate of 0 to 4 g/min/sq. ft. The major components of the system are: (1) the simulant handling equipment, (2) the individual dispersers, (3) the air system, and (4) the control panel. The simulant handling equipment transports the simulant from an underground storage hopper to the individual dispersers. The specially designed items of this equipment are the 8 adjustable splitters which divide the simulant falling through each into

11 equal volume streams which in turn feed the individual dispersers. Fallout simulant and air are supplied continuously to the nozzle, on the disperser, blasting it against the deflector plate; the simulant scatters and falls continuously over the test panels which are surfaced with different roofing materials. The approximate amount of dispersed simulant that lands on each panel is determined by the following method. The simulant transported from each test panel by washdown water during the simultaneous fallout and washdown period is collected in a sieve and weighed. The residual remaining on the test surface after washdown ceases is collected in another sieve and weighed. The total of these two weights is the amount that lands on each panel. (Author)

AD-401 670 Div. 16, 4 *
(TISTB/AW) OTS price $9.60

Electronics Research Lab., U. of Calif., Berkeley.
THE DIELECTRIC PROPERTIES OF WATER AND THEIR ROLE IN ENZYME-SUBSTRATE INTERACTIONS,
by P. O. Vogelhut. 24 Aug 62, 110p. incl. illus. tables, 68 refs. (Series no. 60 Issue no. 476)
(Contract Nonr-22292)
Unclassified report

DESCRIPTORS: *Biophysics, *Water, *Enzymes, Cells (Biology), Ice, Microwave frequency, Pepsins, Molecular structure, Chemical bonds, Catalysis, Dielectric properties, Models (Simulations), Theory.

The structures of water, aqueous solutions, and ice are reviewed, primarily with regard to their electrical characteristics. A new model of water is proposed, based on the concept of double-bond and vacant-bond orientational defects, and is used for the computation of the frequency and temperature dependence of pure and contaminated water (solutions). A new cavity-perturbation measurement technique is used to obtain the dielectric constant of water and of aqueous solutions at microwave frequencies. The results agree well with our model of water and its solutions, and are accurate enough to permit continuous measurements of changes of the dielectric constant of enzyme-substrate mixtures as a function of time after mixing. The data are interpreted on the basis of our new model of water and the analogy with catalytic properties of surfaces of electronic semiconductors; water bound to the surface of the enzyme molecule suggests a protonic semiconductor. Energy levels of the water surface are modified by the presence of residues on the enzyme molecule and may be conveniently expressed by circuit diagrams similar to those used in integrated solid-state circuits. The postulated circuit is a tunnel-diode oscillator, tuned to the characteristic frequency of the substrate molecule, which it attracts and whose bond it breaks by positive feedback.

AD-401 681 Div. 16
(TISTM/WA) OTS price $1.60

St. Vincent's Charity Hospital, Cleveland, Ohio.
EARLY EFFECTS OF RENAL X-IRRADIATION.
Progress rept. on Nuclear Weapons Effects Research (Terminal),
by A. C. Corcoran. 1962, 15p. tables.
(Contract DA 49-193-md-2089)
Unclassified report

DESCRIPTORS: *X rays, *Kidneys, *Radiation effects, Pathology, Kidney function tests, Electrolytes (Physiology), Glutaminase, Carbonic anhydrase, Diuretics, Hypertension.

Severe irradiation (2400-3000 r in 3 divided doses) of dog kidneys induced, at the 3rd post-irradiation day, a state of Na^+ and K^+ loss as compared to the normal kidney. This was followed, after some days, by impairment of water-reabsorbing capacity. The electrolyte-loosing state is associated with relative impairment of response to a variety of agents that, by different mechanisms, suppressed electrolyte reabsorption. The experiments indicated that angiotensin had a renal tubular as well as vasoconstrictor action. The vasculature of the irradiated kidneys developed increased vasoconstrictor responsiveness to angiotensin. (Author)

AD-401 697 Div. 16
(TISTM/CCH) OTS price $1.10

California U., Santa Barbara.
STUDIES ON THE POPULATION DYNAMICS OF BARNACLES AND THEIR ASSOCIATES.
Final rept., 1 Sep 58-1 Sep 62,
by Joseph H. Connell. 26 Feb 63, 9p. refs.
(Contract Nonr-03504, Proj. NR 104-465)
Unclassified report

DESCRIPTORS: *Barnacles, Echinodermata, Population, Physiology, Ecology.

This study emphasizes the importance of biological interactions in determining the distribution and abundance of organisms. All the recent surveys and reviews of intertidal ecology draw inferences as to the causes of intertidal zonation patterns from correlations with environmental factors, mainly physical. This is a result of the methods of study, which have involved extensive surveys with no experimental investigations. Experiments designed to study the effect of physical factors on distribution almost always result in the finding that the limit of toleration of animals and plants are always much greater than those which the animal experiences naturally; thus physical factors are seldom the direct cause of limitation of distributions. From the findings of this and my previous studies it may be suggested that biological interactions play the decisive role in such limitations. (Author)

AD-401 728 Div. 16
(TISTM/WA) OTS price $12.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
RADIATION HYGIENE (SELECTED PARTS),
by S. M. Gorodinskiy, G. M. Parkhomenko and others. 26 Mar 63, 168p. incl. illus. 292 refs.
(Trans. no. FTD-TT-62-1616 from Radiatsionnaya Gigiyena, Vol. 1, Gigiyena Truda, Medgiz, Moskva, pp. 5-39, 87-108, 126-137, 1962)
Unclassified report

DESCRIPTORS: *Radiological dosage, *Radioactivity, *Radiation effects, *Man, Gamma rays, Neutron beams, Beta particles, Health physics, Radiological contamination, Protective clothing.

AD-401 743 Div. 16, 20
(TISTM/CCH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
RESULTS OF INVESTIGATIONS OF THE EFFECT OF

IONIZING RADIATION ON THE RETINA AND CERTAIN PHOTOSENSITIVE SYSTEMS,
by G. G. Demirchoglyan, M. A. Allakhverdyan and others. 18 Mar 63, 15p. incl. illus. 13 refs. (Trans. no. FTD-TT-63-163 from Russian Periodical, Radiobiologiya, 2:3, pp. 442-449, 1962)
Unclassified report

DESCRIPTORS: *Radiation effects, *Retina, *Eye, Radiobiology, Photosensitivity.

AD-401 822 Div. 16
(TISTB/AW) OTS price $1.60

Kent State U., Ohio.
SOME PHYSIOLOGICAL EFFECTS OF SERNYL IN RODENTS.
Progress rept.,
by Charles G. Wilber and Richard G. Schneider.
1 Apr 63, 8p. illus. tables, 11 refs.
(Contract DA 49-193-md-2216)
Unclassified report

DESCRIPTORS: *Drugs, *Psychotropic agents, CNS depressants, CNS stimulants, Anesthetics, Laboratory animals, Electrocardiography, Oxygen consumption, Test methods, Rodents, Neuroses, Dosage.

The drug 1-(1-phenylcyclohexyl) piperidine - HCl, sernyl, was tested using forced swimming in mice and guinea pigs. In low doses sernyl shows a stimulating effect on physical performance as measured by the swim test. In higher doses sernyl depresses swimming time in both mice and guinea pigs. (Author)

AD-401 835 Div. 16
(TISTB/AW) OTS price $1.60

Kent State U., Ohio.
THE INTERACTION OF WIN 19583-4 AND HUNGER DRIVE.
Progress rept.,
by Barry L. Lively. 1963, 16p. incl. illus. table, 7 refs.
(Contract DA 49-193-md-2216)
Unclassified report

DESCRIPTORS: *CNS stimulants, *Drugs, Dosage, Mice, Fatigue (Physiology), Motivation, Appetite, Test methods.

A new psychostimulant, synthesized by Clarke, is a member of a novel series of benzylfurfurylamines. It is reported to be superior to other available psychostimulants. Harris found that WIN 19583-4 induced increased activity in the albino mouse. In his study the drug was compared with the action of another stimulant, dextro amphetamine. The reported results suggest that WIN 19583-4 produced more activity in mice than did dextro amphetamine. In work with depressed and obese human subjects Townshend found that the drug apparently elevated the mood of these patients and also brought about a reduction of weight in some of the patients. These results suggest that the drug might also be effective as a suppressor of the appetite in man. The purpose of this study was to investigate the possible interaction of these two factors. The importance of such interaction is well-documented. Specifically at the various levels of food deprivation the response curves for the various dosage levels would be different not only in vertical displacement, but also with respect to slope. As a matter of operational definition the level of appetite is considered synonymous with the level of hunger as produced by depriving the test animals of food for various periods of time. In order to evaluate the interaction of the drug and the hunger drive, it was necessary to remove any possible contamination of learned responses resulting from the interaction of drive and habit strength. This contamination was kept to a minimum by selecting a measuring device which in turn keeps habit at a constant or a minimal value. (Author)

AD-401 874 Div. 16, 30
(TISTM/CCH) OTS price $3.60

RAND Corp., Santa Monica, Calif.
ANALYSIS OF CHEMICAL CONSTITUENTS OF BLOOD BY DIGITAL COMPUTER,
by James V. Maloney, Jr., James C. DeHaven and others. Apr 63, 33p. incl. illus. tables, 13 refs.
(Memo. no. RM-3541-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Respiratory system, *Stress (Physiology), *Biochemistry, Hematology, Metabolism, Computers, Digital computers, Models simulation, Simulation, Blood.

Recent advances in mathematical programming techniques for complex biochemical systems have made it feasible to construct a computer simulation of the biochemical behavior of human blood. Changes in concentration of some 56 different constituents of plasma, erythrocytes, and alveolar gas can be determined by the model when it is subjected to various simulated stresses. Within two minutes, the digital computer, following programmed instructions describing the basic chemical and thermodynamic reactions of the blood, prints in tabular form the alterations in blood chemistry. A blind competition between the computer and a team of physicians and chemists in a surgical laboratory, working on the same biochemical problem, was carried out. Alterations in blood chemistry occurring with addition alkalosis, hypothermia, respiratory acid-base problems, saline infusion, hyperbaric oxygenation, and metabolic acidosis were studied. Over 1,000 laboratory analyses were compared with computer predictions. (Author)

AD-401 879 Div. 16
(TISTM/AAR) OTS price $1.60

Naval Radiological Defense Lab., San Francisco, Calif.
GROSS DENTAL LESIONS IN THE RAT INDUCED BY X-RAYS AND NEUTRONS,
by T. J. Castanera, D. C. Jones, and D. J. Kimeldorf. 13 Feb 63, 24p. incl. illus. tables, 10 refs. (Rept. no. NRDL-TR-620)
Unclassified report

DESCRIPTORS: *Teeth, Rats, X-rays, Neutrons, Radiation effects, Radiobiology, Pathology.

At approximately 35 days following irradiation the portions of the lower teeth containing the lesion began to emerge from the gums. Several weeks later, the lesions in the upper teeth emerged. The period of maximum incidence of animals with lesions was 50-75 days following either type of radiation. All lesions had disappeared through normal wearing of the continually growing incisor teeth at the biting edges by the end of the fourth month after irradiation. Almost all animals had a lesion in at least one tooth. At the higher radiation doses, the lesion was more pronounced, more teeth had a lesion and more fractures occurred. Supplying food in meal form resulted in a lower incidence of fractures compared with a previous study in which the same food was given in pellet form. Neutrons appeared to be two to three times more effective than x-rays in producing the dental lesions. (Author)

AD-402 013 Div. 16
(TISTM/CCH) OTS price $1.60

Florida U., Gainesville.
EFFECT OF CHRONIC EXPOSURE TO HYPOXIA ON BLOOD PRESSURE AND THYROID FUNCTION OF HYPERTENSIVE RATS,
by Melvin J. Fregly. Mar 63, 8p. incl. illus. tables, 22 refs.
(Contract AF 41(657)370)
(SAM-TDR-63-4) Unclassified report

DESCRIPTORS: *Kidneys, *Hypoxia, *Blood pressure, Heart, Thyroid gland, Urine, Radioactive isotopes, Iodine, Rats, Hypotension, Pathology, Oxygen consumption.

Chronic exposure to an atmosphere containing 13% oxygen protects against development of renal hypertension in rats. The mechanism through which the rats are protected may involve the thyroid gland since certain criteria for assessment of thyroid function, using radioactive iodide, suggest depression of activity. Other physiologic mechanisms, brought into play as a result of hypoxia, may also contribute and need to be studied. (Author)

AD-402 065 Div. 16
(TISTM/CCH) OTS price $3.60

Lobund Inst., U. of Notre Dame, Ind.
THE DESIGN, DEVELOPMENT AND STUDY OF GERMFREE ISOLATORS FOR USE WITH PATIENTS AND IN RESEARCH.
Final technical rept., 1 Sep 60-30 Sep 62,
by P. C. Trexler. 30 Sep 62, 31p. incl. illus. tables, 17 refs.
(Contract DA 49-007-md-878 and Grant no. MEDDH-61-16)
Unclassified report

DESCRIPTORS: *Germfree atmospheres, *Germfree animals, Mice, Rats, Vaccines, Surgery, Bacteria, Bovine, Sheep, Man, Purification, Design, Handling.

Practical methods for using flexible film isolators to produce and distribute germfree mice and rats were developed to the extent that commercial laboratory animal breeders now engage in this activity. The methods of using these animals in the laboratory have been simplified to eliminate unusual requirements of equipment and space for animal studies. A preliminary study to evaluate pertussis vaccine indicated that these animals may be suitable for routine biological testing. A pure culture of Cl. difficile will eliminate the principle anomaly of the germfree animal (distended cecum) to provide the first step in the development of a general purpose laboratory mouse with a completely defined microflora. Methods have been developed for using the larger animals (swine and sheep) in the laboratory with either a total absence of microbes or with pure cultures. The same principles of isolator construction have been used to build isolators for providing a sterile area for human surgery. Isolators have been constructed for either protecting a patient from the microbic environment of the hospital ward or preventing the spread of pathogens from a sick patient. (Author)

AD-402 148 Div. 16
(TISTB/AW) OTS price $1.60

School of Aerospace Medicine, Brooks Air Force Base, Tex.
STUDIES IN DECOMPRESSION SICKNESS. CIRCULATORY AND RESPIRATORY CHANGES ASSOCIATED WITH DECOMPRESSION SICKNESS IN ANESTHETIZED DOGS,
by Sidney D. Leverett, Jr., Harold L. Bitter, and Robert G. McIver. Mar 63, 12p. incl. illus. tables, 15 refs. (Rept. no. SAM-TDR-63-7)
Unclassified report

DESCRIPTORS: *Decompression sickness, Blood circulation, Air, Respiratory system, Test methods, Dogs.

AD-402 149 Div. 16
(TISTM/WA) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
CATECHOLAMINE EXCRETION IN HEAT-ACCLIMATIZED MEN,
by Henry B. Hale, Edgar W. Williams and James P. Ellis, Jr. Mar 63, 5p. incl. illus. table, 17 refs. (Rept. no. SAM TDR 63-20)
Unclassified report

DESCRIPTORS: *Epinephrine, *Climatology, *Adrenal medulla hormones, Temperature, Urine, Chemical analysis, Man, Physiology, Variance analysis, Excretion, Solar radiation.

Sympathoadrenal activity was appraised in 10 healthy men over a 10-week period, beginning in summer and ending in autumn. Two overnight urine samples per subject per week were analyzed for norepinephrine, epinephrine, creatinine, and urea. Evidence of high sympathoadrenal activity was obtained in summer, with reversal in autumn. The different catecholamines were shown to relate either to weekly mean maximum temperature, to weekly mean solar radiation, or to both climatic factors. Catecholamine excretion also tended to vary inversely with urea excretion. (Author)

AD-402 156 Div. 16
(TISTB/AW) OTS price $2.60

Medical Coll. of South Carolina, Charleston.
THE CARDIAC OUTPUT AND VASCULAR RESPONSE TO TRAUMA.
Annual progress rept., 1 Apr 62-31 Mar 63,
by George H. A. Clowes, Jr. 31 Mar 63, 18p. incl. illus. table, 26 refs.
(Contract DA 49-193-md-2312)
Unclassified report

DESCRIPTORS: *Wounds and injuries, *Cardiovascular system, Blood pressure, Blood circulation, Burns, Instrumentation, Metabolism, Acidosis, Surgery, Dyes, Shock (Pathology).

In the investigation of the cardiac output and vascular responses to injury of an additional 70 patients who were operated upon or admitted with injuries were observed during the past year. This was accomplished by serial dye dilution curves and intravascular pressure measurements for periods as long as three months. To relate these observations to the well known metabolic alterations caused by trauma, certain simultaneous blood chemical and respiratory measurements

were made. Both the clinical and laboratory studies confirm the previous observation that uneventful recovery calls forth but little more circulatory activity than that present under basal conditions. Infection or gangrene require a significantly higher cardiac output to avoid serious metabolic derangements which include a progressive and eventually fatal metabolic acidosis. Following a period of shock and low cardiac output, traumatized patients enter a period of high cardiac output associated with increased metabolic expenditure and other aspects of the defense reaction. Respiratory insufficiency increases this demand for cardiac output and may in part be relieved by a respirator . Attention was devoted to the effects of sepsis, gangrene and shock on the circulatory response to trauma during the period of recovery and convalescence. Studies included observations upon the behavior of the extracellular electrolytes, blood gases, and the catechol amine concentrations in the blood. (Author)

AD-402 189 Div. 16
(TISTM/AAR) OTS price $1.60

Clemson Agricultural Coll., S. C.
(No title).
Annual progress rept. 1 Apr 62-31 Mar 63,
by Averett S. Tombes. 31 Mar 63, 16p. incl. illus. table.
(Grant DA-MD-49-193-62-G-60)
Unclassified report

DESCRIPTORS: *DDT (Pest control), *Coleoptera, Reproductive system, Starvation (Animal), Insects, Enzymes.

The enzyme DDT-dehydrochlorinase was studied with an over-all objective of studying its natural physiolgical function in the Mexican bean beetle. The first series of experiments were conducted to determine the relative quantitative values of the enzyme in the male and female. This study demonstrated a two to three times greater amount of the enzyme in the female over that in the male. An additional study was conducted to determine if the enzyme, might be serving as a reserve protein and acting only secondarily as a detoxifying enzyme. When pressure of starvation was used on unsexed adults, there was a sharp decline of 55% of the enzyme in the first 24 hours with a 25% dissipation over the next three days. The total percent protein showed a reduction of about 5% in 24 hours, followed then by a slight increase over the next three days. The reserve protein idea is quite tenable. (Author)

AD-402 223 Div. 16
(TISTM/AAR) OTS price $1.60

Chicago U., Ill.
STUDIES ON CHEMOTHERAPY OF VIVAX MALARIA, FALCIPARUM MALARIA, AND PRIMAQUINE HEMOLYSIS.
Final scientific rept., 1 Aug 62-31 Mar 63,
by Alf S. Alving. 31 Mar 63, 3p. 2 refs.
(Contract DA 49-007-md-566)
Unclassified report

DESCRIPTORS: *Hemosporidia, *Diseases, *Chemotherapeutic agents, Therapy (Medicine), Man, Mice, Cinchona alkaloids.

The therapeutic response of several strains of P. falciparum from Southeast Asia were studied. One strain obtained from Malaya, one from Thailand and one from South Viet Nam have proved resistant to chloroquine. The organisms were all sensitive to quinine. The Thailand and Viet Nam strains were resistant to the Parke-Davis depot drug Cl-501. Investigations of drugs developed on the Cancer Chemotherapy Program and tested in berghei infections of mice by Dr. Ralph Jones, Jr. of Miami were initiated at Stateville Penitentiary in volunteers infected with Chesson vivax malaria. Genetic and biochemical studies of primaquine sensitivity were continued. (Author)

AD-402 256 Div. 16
(TISTM/AAR) OTS price $2.60

Presbyterian-St. Luke's Hospital, Chicago, Ill.
SERIAL CORRELATIONS OF THE CHEMICAL ANATOMY OF HEPATIC AND RENAL CELLS WITH ORGAN STRUCTURE AND CLINICAL STATUS IN MAN.
Progress rept., 1 Apr 62-31 Mar 63,
by Robert M. Kark. 31 Mar 63, 7p. illus. tables, 7 refs.
(Contract DA 49-007-md-637)
Unclassified report

DESCRIPTORS: *Kidneys, *Liver, *Oxidoreductases, Cells (Biology), Potassium, Man, Dogs, Rats, Hemoglobin, Hemolysis (Physiology), Poisonous gases, Blood transfusions (Medicine), Histological techniques (Biology), Microsomes, Enzymes, Kidneys.

AD-402 263 Div. 16
(TISTB/AW) OTS price $1.60

Aerospace Information Div., Washington, D. C.
SOVIET LITERATURE ON LIFE SUPPORT SYSTEMS. PART A, BIOSCIENCES.
29 Mar 63, 17p. incl. illus. tables, 8 refs.
(AID rept. P-63-45)
Unclassified report

DESCRIPTORS: *Life support, *Radiobiology, Algae, Epinephrine, Telemetering transmitters, Body temperature, Cholesterol, Vibration, Nervous system, Brain, Phosphorylation, Space environmental conditions, Physiology.

Contents:
Effects of adrenaline oxidation products on radiation leucopenia
The hygienic significance of vibration and the clinical aspects of vibration sickness
Problems of telemetry
Increasing body resistance to high temperature
The higher nervous activity of white rats in the flight of the second spaceship-satellite
First results of experiments conducted with a Chlorella culture exposed to space environment in second spaceship-satellite
Oxidative phosphorylation and transformations of pyruvic acid in brain mitochondrid of normal and irradiated animals
Cholesterol metabolism in dogs with radiation sickness

AD-402 294 Div. 16
(TISTM/AAR) OTS price $2.60

Naval Radiological Defense Lab., San Francisco, Calif.
DIFFERENTIAL RESPONSE TO ALLOGENIC AND XENOGENIC SKIN GRAFTS BY SUBLETHALLY IRRADIATED (670 RAD) AND NON-IRRADIATED MICE SENSITIZED BY VARIOUS MEANS,
by M. L. Tyan and L. J. Cole. 11 Mar 63, 22p. incl. tables, 13 refs. (Rept. no. NRDL-TR-628)
Unclassified report

DESCRIPTORS: *Skin, *Radiation effects, Mice, Spleen, Rat, Immunology, Cells (Biology), Transplantation.

Twelve to 14-week-old female LAF1 mice were presensitized either with 3 i.p. injections of BALB/c or rat spleen or skin cells, or by means

of two consecutive BALB/c or rat skin tail grafts. One week following the last injection or the rejection of the second skin graft, the mice either were grafted with LAF1, BALB/c, C3D/2 and rat skin or they received 670 rad whole body X-radiation and were grafted immediately thereafter. The data indicate that skin grafts induce a more vigorous and more radioresistant second-set response than do dissociated cells. Pre-sensitization with allogenic spleen cells resulted in prolonged survival of subsequent allogenic skin grafts in sublethally irradiated mice. The second-set response to a xenogenic skin graft was found to be more radioresistant than was that to an allogenic graft. The converse was true with regard to the first-set response. (Author)

AD-402 295 Div. 16
(TISTM/AAR) OTS price $1.60

Naval Radiological Defense Lab., San Francisco, Calif.
THE RELATIVE EFFECT OF PULSED RADIATION EXPOSURE IN PRODUCTION OF ACUTE MORTALITY IN MICE,
by E. J. Ainsworth, G. F. Leong and others.
8 Mar 63, 14p. incl. illus. 14 refs. (Rept. no. NRDL-TR-627)
Unclassified report

DESCRIPTORS: *Radiation effects, Survival, Fission neutrons, Gamma rays, Neutrons, Radiobiology, Mice.

Mice were subjected to pulsed exposures of either fission spectrum neutrons or gamma radiation produced by a Triga Mark F reactor. The acute mortality response of animals given pulsed radiation of the order of 10 to the 6th rads/minute was compared with mortality responses obtained by neutron irradiation at 40 rads/minute and gamma irradiation at 100 rads/minute. No significant differences in LD(50/30) were observed as a function of dose rate with either gamma or neutron irradiation. (Author)

AD-402 395 Div. 16
(TISTB/MS) OTS price $10.50

Strategic Air Command, Offutt Air Force Base, Nebr.
USAF SANITARY AND INDUSTRIAL HYGIENE ENGINEERING SYMPOSIUM PROCEEDINGS, SPONSORED BY STRATEGIC AIR COMMAND, CONVENED AT 392d AEROSPACE MEDICAL GROUP, VANDENBERG AIR FORCE BASE, CALIFORNIA - 9-12 OCTOBER, 1962.
1962, 133p. incl. illus. tables, 15 refs.
Unclassified report

DESCRIPTORS: *Symposia, *Industrial medicine, Sanitary engineering, Hazards, Toxicity, Propellants, Costs, Health physics, Nuclear power plants, Nuclear engineering, Radiological dosage, Safety, Dosimeters, Microwaves.

AD-402 419 Div. 16, 12
(TISTA/GEC) OTS price $2.25

General American Transporation Corp., Niles, Ill.
CARBON DIOXIDE REDUCTION SYSTEM.
Rept. for Apr 61-Aug 62 on Equipment for Life Support in Aerospace,
by G. A. Remus, R. B. Neveril and J. D. Zeff.
Jan 63, 75p. incl. illus. tables, refs. (Rept. no. MR 1163-50)
(Contract AF 33(616)8223, Proj. 6373)
(AMRL TDR 63-7) Unclassified report

DESCRIPTORS: *Closed cycle ecological systems, *Carbon dioxide, Life support, Space flight, Operation, Tests, Air conditioning equipment, Spacecraft cabins, Design, Reduction.

An automatically operated carbon dioxide reduction system was designed, fabricated and tested. The system will reduce 0.365 lbs of CO2 per hour equivalent to a 3.2-man CO2 output, and is required for providing respiratory support for man on extended space missions. The program was conducted in three phases, analysis of a reactor developed on a previous contract, experimental determination of design parameters, and fabrication and testing of an improved engineering model. Operating characteristics, feed gas compositions, recycle flow rates, reaction temperatures and pressures, and catalyst composition and configuration were established and the effects of variations in these were determined. (Author)

AD-402 444 Div. 16
(TISTB/AW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
MOTION SICKNESS: PROPHYLAXIS AND TREATMENT,
by Docent G. Komendanto and V. Kopanev.
2 Apr 63, 5p. (Trans. no. FTD-TT-63-287 from Russian newspaper, Meditsinskaya Gazeta, p. 3, 5 Dec 62)
Unclassified report

DESCRIPTORS: *Motion sickness, Conditioned response, Diet, Drugs, Therapy.

AD-402 456 Div. 16
(TISTM/CCH) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
RIBONUCLEINIC ACID AS A STIMULATOR OF ALGAE GROWTH,
by V. P. Vendt and I. G. Drokova. 25 Mar 63, 6p. incl. illus. 13 refs. (Trans. no. FTD-TT-63-291 from Ukrainskiy Botanichniy Zhurnal, 19:6, pp. 60-63, 1962)
Unclassified report

DESCRIPTORS: *Ribonucleic acid, *Algae, Growth substance, Growth.

AD-402 458 Div. 16
(TISTM/CCH) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
COACERVATES AND FERMENTS ALBUMIN-CARBOHYDRATE. COACERVATES AND ALPHA-AMYLASES,
by A. I. Oparin, T. N. Yevreinova and others.
14 Mar 63, 5p. incl. illus. 8 refs. (Trans. no. FTD-TT-63-191 from Doklady Akademii Nauk SSSR, Biochemistry, 104:4, pp. 581-583, 1955)
Unclassified report

DESCRIPTORS: *Albumins, *Glycoside hydrolases, Separation, Decomposition, Biochemistry, Carbohydrates, Separation.

17. METALLURGY

AD-401 046 Div. 17, 26
(TISTM/BRW) OTS price $2.60

Narmco Industries Inc., San Diego, Calif.
THE INVESTIGATION OF EXOTHERMIC BRAZING OF REFRACTORY ALLOYS.
Quarterly rept. no. 1,
by R. O. Banning, J. R. Armstrong and R. A. Long.
28 Feb 63, 15p. incl. illus. tables.
(Contract N600(19)59237)
Unclassified report

Division 17 - METALLURGY

DESCRIPTORS: *Heat-resistant metals and alloys, Molybdenum, Niobium, Tantalum, Tungsten, Chemical reactions, Heat of formation, Soldering alloys, Heat of reaction, Thermal joining, Brazing.

Heat producing as well as heat and metal-producing exothermic systems for brazing of refractory alloys were evaluated. Characteristics taken into consideration were: heat of reaction, ignition temperature, metal production, metal-ceramic composite characteristics, and base metal-exotherm compatibility. Brazed joints were made in unalloyed molybdenum, tungsten, columbium and tantalum, using commercially-available brazing alloys with flow temperatures ranging up to 3100 F. Brazing was accomplished in air without protective atmospheres with essentially no oxidation or contamination of the base metals. (Author)

AD-401 097 Div. 17
(TISTM/AM) OTS price $2.60

General Dynamics/Fort Worth, Tex.
LONG-TIME INTERMITTENT CREEP.
Quarterly progress rept. no. 2, 15 Oct 62-15 Jan 63,
by O. N. Thompson and R. L. Jones. Jan 63, 30p. incl. illus. tables (Rept. no. FPR-007)
(Contract AF 33(657)8907)
Unclassified report

DESCRIPTORS: *Creep, *Titanium alloys, *Stainless steel, *Nickel alloys, Aluminum alloys, Molybdenum alloys, Alloys, Stresses, Research program administration, Vanadium alloys, Mechanical properties.

This program consists of measuring the effects of creep as well as the magnitude of creep resulting from steady and intermittent load application at 550 F and 650 F up to 30,000 hours. The materials under investigation are Ti8Al-1Mo-1V, Ti6Al-4V, AM350SCT, and PH15-7Mo stainless steels and Rene' 41 superalloy. (Author)

AD-401 110 Div. 17
(TISTM/AMS) OTS price $4.60

General Dynamics/Convair, San Diego, Calif.
EFFECT OF STRETCHING ON MECHANICAL AND FATIGUE PROPERTIES.
Report on Material - Aluminum - 2024-T4 Extrusions,
by R. J. Haney, G. D. Lindeneau, and W. E. Wise. 25 June 58, 36p. incl. illus. tables (Rept. no. 8926-126)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Aluminum alloys, *Stretch forming, Aluminum, Mechanical properties, Tensile properties, Fatigue (Mechanics), Hardness, Extrusion, Experimental data, Compressive properties, Thickness.

A large extruded Tee-section made from 2024 aluminum alloy was subjected to fifteen variations in degree of stretch, solution heat treatment and natural aging sequences. The various processing sequences approximated various manufacturing steps, and the mechanical and fatigue properties resulting therefrom were desired for comparison with minimum design allowable strengths already established for unstretched extrusions. In all cases the processed extrusion mechanical and fatigue properties exceeded design minima for unstretched extrusions. In general, the strengths were higher than established minima, and the elongations approached minimum values. (Author)

AD-401 127 Div. 17
(TISTM/AMS) OTS price $4.60

Universal-Cyclops Steel Corp., Bridgeville, Pa.
MOLYBDENUM SHEET ROLLING PROGRAM.
Interim rept. no. 19, 26 Oct 62-25 Jan 63. 25 Jan 63, 1v. incl. illus. tables.
(Contract NOas 59-6142-c)
Unclassified report

DESCRIPTORS: *Molybdenum alloys, *Sheets, Titanium alloys, Forging, Heat treatment, Surface properties, High temperature research, Mechanical properties, Tensile properties, Transition temperature, Hardness, Mechanical working, Ductility, Hot working.

Ten sheets of Mo+0.5%Ti, 0.060-in. x 24-in. x 72-in. were produced, five sheets from each of two ingots. Tests from two sheets from one ingot show flatness to be within 1% and gauge within ± .002-in. Bend transition was in the range of 0 to -75 F with a recrystallization temperature of 2250 F. Unusually high 2000-F-tensile property results are being checked. Rolling of material for Phase II TZM was accomplished. Testing of the product is approximately 90% complete. A tentative process for Phase III pilot rolling was selected. (Author)

AD-401 286 Div. 17
(TISTM/AMS) OTS price $2.60

Louisville U., School of Medicine, Ky.
CHARACTERIZING FRACTURES BY ELECTRON FRACTOGRAPHY PART X, FRACTOGRAPHY OF NOTCH TENSILE SPECIMENS OF 4300-SERIES STEELS,
by A. J. Edwards and C. D. Beachem. Feb 63, 3p. illus. table, 1 ref. (NRL memo. rept. 1394)
Unclassified report

DESCRIPTORS: *Fracture (Mechanics), *Steel, *Fractography, Metallography, Impact shock, Shock resistance, Tensile properties, Carbon, Carbon alloys, Failure (Mechanics), Brittleness, Electron microscopes.

Fracture faces of round-bar notch tensile specimens of five different 4300-series steels were examined in the electron microscope. The dependence of fracture mode on carbon content and relative yield strength level was investigated. A diagram is presented to show the dominant fracture modes observed for various combinations of yield strength and carbon content. (Author)

AD-401 330 Div. 17, 26
(TISTM/AMS) OTS price $1.60

General Dynamics/Convair, San Diego, Calif.
EVALUATION OF PROTRUDING HEAD, OVERAGED RIVETS.
Report on Material - Aluminum - 7075-T6,
by J. L. Harvey, W. M. Parker, and H. C. Turner
17 Apr 59, 19p. incl. illus. tables (Rept. no. 8926-132; 57-555)
(Contracts AF 33(657)8926 and AF 33(600)30169)
Unclassified report

DESCRIPTORS: *Aluminum alloys, *Rivets, Heat treatment, Aging (Materials), Tests, Stresses, Corrosion, Shear stresses, Fracture (Mechanics), Manufacturing methods, Tensile properties.

Overaged 7075-T6 aluminum alloy rivets were sought as replacement for 2024-T31 aluminum rivets which presented production difficulties. Heat treatment of 7075-O aluminum alloy rivets by means of a 30-minute 870 F solution heat treatment, followed by water quenching and aging for 4-1/2 hours at 325 F provided 7075-T6 rivets which were 10% stronger than 2024-T31

rivets, and were comparable with the 2024-T31 rivets with respect to driving characteristics. Salt spray tests of 500 hours duration with rivets stressed to 40, 50, 60 and 68% of their ultimate tensile strength did not indicate incidence of stress corrosion cracking. The solution potential of the 7075-T6 was not changed by the revised heat treatment. (Author)

AD-401 333 Div. 17
(TISTM/AMS) OTS price $1.60

General Dynamics/Convair, San Diego, Calif.
EFFECT OF ELEVATED TEMPERATURES ON MECHANICAL PROPERTIES.
Report on Material - Aluminum - 2014-T6, 2024-T6 and 2024-T86 Alloys,
by A. Giuntoli, P. W. Bergstedt, and H. C. Turner. 9 Jan 59, 17p. incl. illus. tables.
(Rept. no. 8926-140; MP 58-077)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Aluminum alloys, *High temperature research, Sheets, Time, Mechanical properties, Temperature, Tensile properties, Compressive properties, Shear stresses, Experimental data.

Tension tests conducted with 2014-T6 aluminum alloy billet and 0.050 and 0.125-inch-thick 2024-T6 and 2024-T86 aluminum alloy sheet at room temperature and after heatings of 300, 370 and 425 F for 1/2, 10 and 100 hours showed, within the time limits expressed, the time independence of the mechanical properties of the alldys studied at temperatures up to 300 F At temperatures in excess of 300 F, time-dependence in the mechanical properties of the alloys asserted itself. (Author)

AD-401 345 Div. 17
(TISTM/AMS) OTS price $4.60

Illinois U., Urbana.
STUDIES OF BRITTLE FRACTURE PROPAGATION.
Final rept.,
by W. J. Hall and F. W. Barton. 17 Jan 63, 1v. incl. illus. refs. (Structural research series no. 256)
(Contract NObs 65790)
Unclassified report

DESCRIPTORS: *Fracture (Mechanics), *Ship plates, Compressive properties, Tensile properties, Thermal stresses, Impact shock, Load distribution, Loading (Mechanics), Shock resistance, Brittleness, Civil engineering, Low temperature research, Metal plates, Stresses, Welds, Velocity.

AD-401 385 Div. 17
(TISTP/TL) OTS price $3.60

General Dynamics Convair, San Diego, Calif.
COMPARATIVE WEAR RESISTANCE.
Report on Material - Finishes and Coatings - Wear Preventative for Aluminum and Titanium,
by R. J. Barlow, A. R. Vollmecke, and W. E. Wise. 26 Apr 57, 34p. incl. illus. tables (Rept. no. 8926-133; 56-64)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Metals, *Aluminum alloys, *Titanium alloys, *Materials, *Metal coatings, Corrosion, Deformation, Stresses, Adhesion, Water impingement, Sea water, Corrosion inhibition, Friction, Surfaces, Shear stresses, Sprays, Ball bearings, Coatings, Preservation, Antifouling coatings.

The wear resistance of 25 different finish coatings applied on 7075-T6 aluminum alloy and AMS 4925 titanium alloy was tested with wear couples incorporating either coated aluminum or titanium alloy and chrome-plated 4130 steel. Comparisons of individual test results were made by reference to tests made with chrome-plated 4130 steel and Specification MIL-B-6946 bronze. All tests were made with a Timken wear test machine. Nitrided and molybdenum spray coatings applied to titanium, and hard anodize or chrome plate applied to aluminum provided better wear resistances in couples lubricated with Specification MIL-L-7870 lubricating oil than similarly lubricated, chrome-plated, steel-bronze wear couples. Electrofilm 4396 solid-film dry lubricant provided the greatest wear life of all such lubricants tested. Five hundred hours of salt spray impingement produced no corrosive effects on titanium. Two hundred fifty hours of salt spray resulted in no corrosion of hard anodized or electrofilm-4396-coated, 7075-T6 bare aluminum; however, only Electrofilm 4396 withstood the salt spray impingement when 7075-T6-clad aluminum was tested. Supplementary tests with anodized titanium indicated the better performance.

AD-401 387 Div. 17
(TISTM/AM) OTS price $1.60

General Dynamics Convair, San Diego, Calif.
RESISTANCE AND FUSION WELD STRENGTHS.
Report on Material - Steel - Stainless - Type 422M,
by A. Giuntoli, P. W. Bergstedt, and H. C. Turner. 30 Oct 58, 17p. incl. illus. (Rept. no. 8926-138; MP58-096)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Stainless steel, *Welds, Resistance welding, Arc welding, Tensile properties, Austenite, Shear stresses, Heat treatment, Ductility, Hardness, High temperature research, Mechanical properties.

The resistance and fusion weld strengths of United States Steel Corporation 12MoV stainless steel, a modified 12% chromium steel, were determined with sheet material which was heat treated by austenitizing at 1850 F., air cooling and tempering at 900 F. for 4 hours, and welding. Resistance-welded 0.008, 0.016, 0.025 and 0.050-inch-thick sheets were generally capable of meeting Specification MIL-W-6858 tensile-shear strength requirements with tensile shear-cross tension ratios of about 0.20 when welded in the full heat-treated condition (220,000-psi yield strength). The joint efficiency of fusion welded sheets which were welded in the fully heat treated condition was found to be about 80%. (Author)

AD-401 388 Div. 17
(TISTM/AM) OTS price $1.10

General Dynamics/Convair, San Diego, Calif.
COUNTERSUNK RIVET SHEAR STRENGTHS.
Report on Material - Nickel Base Alloy - Monel Metal,
by J. K. Neary, H. A. Buehler, and W. E. Wise. 10 June 58, 9p. incl. illus. tables (Rept. no. 8926-128; 57-651)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Titanium alloys, *Nickel alloys, *Stresses, Deformation, Tensile properties, Failure (Mechanics), Test methods, Sheets, Rivets, Joints.

The ultimate and yield strength of AN427 Monel metal 5/32 and 3/16-in.-diameter rivets driven into various thicknesses of Ti 6Al-4V alloy sheet were determined. Rivet installations in sheet thicker than 0.060 in. failed by rivet shear. Those joints which contained sheet material of less than 0.060-in. thickness failed by tear-out or crushing under the rivet. The ultimate and yield strengths of those rivets which failed in shear were: 3/16 in. diam, 1781 and 2726 lbs. respectively; and 5/32 in. diam, 1590 and 1985 lbs. respectively. (Author)

AD-401 399 Div. 17
(TISTM/AM) OTS price $3.60

Martin-Marietta Corp., Baltimore, Md.
THE EFFECT OF SURFACES ON THE MECHANICAL BEHAVIOR OF METALS.
Final rept., 1 Jan-31 Dec 62,
by I. R. Kramer. Mar 63, 39p. incl. illus. tables, 10 refs.
(Contract AF 33(616)7976, Proj. 7353)
(ASD TDR-63-101) Unclassified report

DESCRIPTORS: *Aluminum, *Copper, *Gold, *Heat of activation, *Single crystals, *Material removal, Creep, Stresses, Tensile properties, Deformation, Crystal lattice defects, Data, Metals.

The activation energies for plastic flow of aluminum, copper and gold were found to decrease as functions of the rate of metal removal. The decrease in activation energy was largest for aluminum and smallest for gold. As calculated by the usual methods, the activated volume for aluminum decreases with the polishing rate; however, it is shown that this method of determining the activated volume is incorrect. A study of the metal recovery process showed that it is associated with the ability of dislocations to escape from the crystal and the relaxation of dislocations in the debris layer. The activation energy at low strains for aluminum crystals is related almost entirely to the debris layer. (Author)

AD-401 407 Div. 17
(TISTM/AM) OTS price $2.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
THE EFFECT OF HYDROGEN ON ALUMINUM: AN ANNOTATED BIBLIOGRAPHY,
comp. by C. G. Gros. Mar 63, 19p. 49 refs.
(Special Bibliography no. SB-62-68; 5-73-62-2)
Unclassified report

DESCRIPTORS: *Bibliography, *Aluminum, *Hydrogen embrittlement, Arc welding, Casting, Degasification, Aluminum alloys.

This work treats of the effect of hydrogen on aluminum, with reference to welding at room temperature and the ultimate reliability of aluminum thus treated in space applications; it covers the period from 1950 through 1962. A few citations to non-ferrous metals which might lead to information about aluminum have been included. (Author)

AD-401 439 Div. 17
(TISTM/AM) OTS price $1.60

Southern Research Inst., Birmingham, Ala.
DEVELOPMENT OF HIGH STRENGTH AND FRACTURE TOUGHNESS IN STEELS THROUGH STRAIN-INDUCED TRANSFORMATIONS.
Quarterly progress rept. no. 2, 1 Oct-31 Dec 62,
by J. D. Morrison, M. A. Campbell, and J. R. Kattus. 3 Jan 63, 21p. incl. tables.
(Contract DA 01-009-ORD-1070)
(Technical rept. no. WAL TR 323.4/2-1)
Unclassified report

DESCRIPTORS: *Stainless steels, *Cold-working, Mechanical properties, Hot working, Austenite, Martensite, Dispersion hardening, Low temperature research, Hardness, Chemical analysis, Heat treatment.

A study is being made to determine the effects of variations in alloy content, cold-working temperature, and amount of cold work on the tensile and toughness properties of stainless steels, generally of the Type 301 composition. The aim of this program is to arrive at an alloy composition and processing procedure that will produce an optimum combination of strength and toughness. The experimental materials have been produced, machined into rolling blanks, and hot rolled at 2000 F to a wrought structure. Cold-rolling operations are now in progress. Mechanical-property data to be obtained at 80 F and -200 F for screening purposes include 0.2%-offset yield strength, ultimate tensile strength, elongation in 2 in., modulus of elasticity, and fracture toughness (Kc). From these data, it will be possible to select for further evaluation those alloy variations having a better combination of strength and toughness than does the basic 301 composition. (Author)

AD-401 458 Div. 17
(TISTM/LMH) OTS price $9.10

Martin-Marietta Corp., Baltimore, Md.
ELASTO-PLASTIC ANALYSIS OF STRUCTURES UNDER LOAD AND TWO-DIMENSIONAL TEMPERATURE DISTRIBUTIONS. VOLUME III. EXPERIMENTAL EVALUATION OF THE GENERAL TIME-DEPENDENT ANALYSIS.
Final rept., 15 Feb 62-1 Jan 63 on Structural Analysis Methods,
by R. J. Edwards. Mar 63, 93p. incl. illus.
(Contract AF 33(616)7738, Proj. 1467)
(ASD TR 61-667, vol. 3) Unclassified report

DESCRIPTORS: *Structural shells, Load distribution, Temperature, Distribution, Plasticity, Experimental data, Creep, High temperature research, Thermal stresses.

Investigations were performed to determine experimentally the validity of the time-dependent aspects of a time-dependent, elasto-plastic stress and strain analysis method for structures exposed to complex load and two-dimensional elevated temperature environments. An experiment to evaluate the accuracy of the theoretical method is presented. This consisted of a test of a long flat plate subjected to step functions of load randomly combined with several two-dimensional temperature distributions. Magnitude and duration of the test variables were such that plasticity, creep, and appreciable thermal stress systems were introduced. Comparisons are made of experimental total strains with analytical total strains calculated for conditions identical with the test. The degree of correlation achieved indicates verification of the analysis method within the range of test parameters selected. (Author)

AD-401 459 Div. 17, 14, 10
(TISTM/AW) OTS price $11.00

Beech Aircraft Corp., Boulder, Colo.
ESTABLISHING TANK DESIGN CRITERIA FOR LIQUID HYDROGEN ROCKETS.
Final rept. for period ending 15 Sep 61,
by J. E. Bell and H. E. Sutton. May 62, 142p. incl. illus.
(Contract AF 33(616)5154, Proj. 3084)
(AFFTC TR 60-43, vol. 3) Unclassified report

DESCRIPTORS: *Liquefied gases, *Propellant tanks, Cryogenics, Hydrogen, Liquid rocket propellants, Thermal insulation, Encapsulation,

Chromium alloys, Titanium alloys, Vanadium alloys, Aluminum alloys, Zirconium alloys, Molybdenum alloys, Tin alloys, Tensile properties, Failure (Mechanics), Glass textiles, Aluminum, Structural properties, Materials.

Structural material for liquid hydrogen tanks, insulation for the side walls and the ends, and encapsulation materials are discussed. The materials chosen are primarily for the 7,000-gallon test tank which was tested in the thermal test facility, but the materials for the most part are applicable to actual rocket vehicle tanks containing cryogenic liquids. (Author)

AD-401 505 Div. 17, 15
(TISTM/AM) OTS price $6.60

Ohio State U., Columbus.
THERMAL STRESSES DUE TO LARGE SPANWISE TEMPERATURE GRADIENTS IN LONG THIN PLATES.
Interim technical rept., 1 Sep 61-1 Aug 62 on Mechanics of Flight,
by B. E. Gatewood, R. G. Dale, and A. R. Glaser.
Jan 63, 62p. incl. illus. tables, 18 refs.
(Contract AF 33(616)8330, Proj. 7063)
(ARL 63-4) Unclassified report

DESCRIPTORS: *Thermal stresses, Partial differential equations, Numerical analysis, Fourier analysis, Metal plates.

The results of a theoretical and experimental investigation of the thermal strains and stresses produced in unrestrained, long thin rectangular plates by large spanwise temperature gradients are presented. The temperature distribution is steady state and the stress distribution approximates the two-dimensional 'plane stress' solution of elasticity theory. Two temperature gradients were investigated, one in which the temperature changed about 150 F over a five-inch distance and one in which the temperature changed about 70 F over a one-inch distance. It was found that for these relative large temperature gradients the solutions for the thermal stresses given in the literature were either not applicable or impractical because of the large number of terms required in the series type solutions. By converting one of the available Fourier Series solutions into a Fourier Integral and using residues and superposition, it is possible to construct a solution for the stresses in which only a few terms are needed in the series for the residues. The calculated thermal strains compare reasonably well with the experimental results, although there is considerable scatter in the strain gage results on the tests. (Author)

AD-401 528 Div. 17
(TISTM/BRW) OTS price $9.60

Metals Processing Lab., Mass. Inst. of Tech., Cambridge.
THE INVESTIGATION OF THE ACTIVATED SINTERING OF TUNGSTEN POWDER.
Final rept., 1 Nov 61-31 Jan 63,
by J. H. Brophy, H. W. Hayden and others.
28 Feb 63, 110p. incl. illus. tables, 16 refs.
(Contract NOw 61-0326-d)
Unclassified report

DESCRIPTORS: *Tungsten, *Tungsten alloys, Powder metallurgy, Additives, Solids, Density, Diffusion, Transport properties, Palladium, Rhodium, Ruthenium, Platinum, Nickel, Iridium, Cobalt, Iron, Porosity, Group VIII elements, Powder metals, Copper, Sintering.

Low temperature densification of tungsten can be accelerated by additions of palladium, rhodium, ruthenium, and platinum in a manner similar to that observed with nickel additions. The cause for this acceleration is an enhancement of the grain boundary diffusion process found to dominate the densification of commercially pure tungsten in the same temperature range. In contrast to the other Group VIII elements examined, iridium retards the densification of tungsten at 1100 C. An analysis of activated solid state sintering and more conventional liquid phase sintering in tungsten indicates that the two processes are similar and together comprise a general phenomenon called carrier-phase sintering. (Author)

AD-401 584 Div. 17
(TISTM/BRW) OTS price $3.60

Aerospace Corp., Los Angeles, Calif.
YIELDING AND FLOW OF IRON,
by Hans Conrad. 27 Feb 63, 33p. incl. illus. 60 refs. (Rept. no. TDR-169(3240-11)TN-2)
(Contract AF 04(694)169)
(SSD-TDR-63-27) Unclassified report

DESCRIPTORS: *Iron, Theory, Equations, Crystal lattice defects, Impurities, Stresses, Thermal stresses, Grain structure (Metallurgy), Deformation, Mechanical properties.

The discussion covers yielding and flow of iron from a different viewpoint than that of Allen or Low (N. P. Allen or J. R. Low, Contribution to High Purity Iron and its Dilute Solid Solutions (Interscience Publishers, Inc., New York, 1963)). Special attention is given to the identification of the dislocation mechanisms responsible for the parameters of the Hall-Petch equation (E. O. Hall, Proc. Phys. Soc. B64:747, 1951, and N. J. Petch, J. Iron and Steel Inst., 174:25, 1953, and Progr. in Metal Phys., 5:1, 1954). Also, an explanation for the yield point is given, which appears to be in better agreement with the experimental data than Cottrell's theory (A. H. Cottrell, Trans. AIME 212:192, 1958) of breaking away from an interstitial atmosphere. This discussion will only be concerned with iron and steel where the effects of alloying elements other than the interstitials are negligible. (Author)

AD-401 592 Div. 17
(TISTM/AM) OTS price $6.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
AUTOMATIC WELDING (SELECTED ARTICLES).
29 Mar 63, 64p. incl. illus. tables, refs.
(Trans. no. FTD-TT-62-1247 from Russian Periodical, Avtomaticheskaya Svarka, No. 5, pp. 1-24, 57-63, 78-88, 1962)
Unclassified report

DESCRIPTORS: *Welding, *Arc welding, *Electron beams, *Diffusion, *Pressure, Welds, Joints, Mechanical properties, Austenite, Titanium alloys, Fluxes, Programming (Computers), Steel, Welding.

AD-401 599 Div. 17
(TISTM/BRW) OTS price $5.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
IDENTIFICATION AND INVESTIGATION OF HEAT-RESISTANT ALLOYS ON A Fe - Ni - Cr BASE,
by M. V. Pridantsev, E. I. Belikova and others.
29 Mar 63, 52p. incl. illus. tables, 12 refs.
(Trans. no. FTD-TT-63-12 from Russian book,

Division 17 - METALLURGY

Spetsial'nyye Stali i Splavy. Tsentral'nyy Nauchno-Issledovatel'skiy Institut Chernoy Metallurgii im. I P Bardina. Institut Kachestvennykh Staley, Moskva, Issue No. 27, pp. 93-138, 1962)
Unclassified report

DESCRIPTORS: *Heat-resistant metals & alloys, Iron alloys, Chromium alloys, Nickel alloys, Alloys, Aluminum, Titanium, Tungsten, Boron, Carbon, Manganese, Silicon, Heat treatment, Hardening, Microstructure, Molybdenum, Niobium, Vanadium, Mechanical properties.

AD-401 640 Div. 17, 30
(TISTP/MB) OTS price $.75

Belfour Engineering Co., Suttons Bay, Mich.
DEVELOPMENT AND IMPLEMENTATION OF A MATERIALS INFORMATION PROCESSING SYSTEM.
Final rept., Feb 61-Apr 62,
by Albert J. Belfour. Jan 63, 24p. 105 refs.
(Contract AF 33(616)8046, Proj. 7381)
(ASD TDR 62819) Unclassified report

DESCRIPTORS: *Metals, *Information retrieval, Materials, Structures, Mechanical properties, Data processing systems.

A program is described for acquisition, storage, analysis and dissemination of materials information. A specific and representative portion of the Materials Information System is used as a model and discussed in detail. The System is designed to store individual test data and associated descriptive information. It therefore provides the capability for data analysis based on complex interactions, graphic or tabular display of data, and more conventional bibliographic output. (Author)

AD-401 760 Div. 17
(TISTM/BRW) OTS price $1.60

Materials Research Lab., Inc., Richton Park, Ill.
THE USE OF STRAIN SOFTENING TO IMPROVE THE PROPERTIES OF REFRACTORY METALS.
Quarterly progress rept. no. 3, 1 Dec 62-28 Feb 63,
by S. Mostovoy and E. J. Ripling. 28 Feb 63, 5p. illus. 1 ref.
(Contract NOw 62-0725-c)
Unclassified report

DESCRIPTORS: *Molybdenum alloys, Titanium alloys, Transition temperature, Deformation, Ductility, Rolling mills, Laboratory equipment, Sheets, Heat resistant metals and alloys, Mechanical properties.

The roller-flexing machine was completed and delivered during this report period. A few samples of Mo-1/2Ti were flexed at room temperature and at +300 F. On the basis of these preliminary data, a significant lowering of the transition temperature appears possible. In order to measure a complete longitudinal and transverse transition temperature on one or two flexed pieces, small bend samples are used for ductility evaluation. Surprisingly, it was found that longitudinal flexing lowers the transverse transition at least as much as the longitudinal transition. Because of a shortage of tungsten, all of the work during this period and probably the next one will be restricted to the molybdenum +0.5% titanium alloy. Only after evaluating the influence of a number of variables including number of cycles, working temperature and direction on the more plentiful molybdenum, will tungsten be used. The amount of bending put into the sample during room temperature flexing is controllable and easily reproduced. At elevated temperatures, however, where the sample cannot be seen, the amount of bending has been a variable, and a modification in flexing technique will be required to assure a reproducible bending condition in each plate. (Author)

AD-401 796 Div. 17
(TISTM/BRW) OTS price $2.60

Aeronutronic, Newport Beach, Calif.
RESEARCH IN THE MECHANISM OF STRENGTHENING IN AUSFORMED STEEL.
Final rept., 15 Mar 61-15 Feb 62 on Metallic Materials,
by C. F. Martin, W. W. Gerberich, and others.
Feb 63, 98p. incl. illus. tables, 26 refs.
(Rept. no. U 1752)
(Contract AF 33(616)8116, Proj. no. 7351)
(ASD-TDR-62-692) Unclassified report

DESCRIPTORS: *Steel, Austenite, Martensite, Deformation, Heat treatment, Sheets, Rolling mills, Electron microscopy, Mechanical properties, Dispersion hardening, Grain structure (Metallurgy), Transition temperature, Crystal lattice defects, Hardness, Microstructure, Hot working.

An investigation was conducted to define the mechanism responsible for the strengthening increase imparted by deformation of metastable austenite. The relationships of mechanical properties to extent and temperature of deformation were developed for Type H-11 hot work die steel. The influence of nonmartensitic decomposition products on ausformed properties was determined. The microstructures were studied by thin-film electron transmission methods for observations of martensite morphology and substructures and precipitates. Measurements of subcell sizes and distribution of precipitates were made for comparison with observed mechanical properties through application of dislocation theory. The observed dislocation density and carbide dispersion indicate that the strengthening mechanism active in both ausformed and conventionally heat treated martensitic steels is some combined effect of dislocation-precipitate and dislocation-dislocation interaction. (Author)

AD-401 811 Div. 17
(TISTM/BRW) OTS price $.75

General Dynamics/Pomona, Calif.
ANELASTIC BEHAVIOR OF TANTALUM AND COLUMBIUM.
Final rept., Mar 60-Oct 61 on Metallic Materials,
by R. J. Sneed, E. L. Fink and M. C. Abrams.
Feb 63, 121p. incl. illus. tables, 49 refs.
(Contract AF 33(616)7235)
(ASD-TDR-62-323) Unclassified report

DESCRIPTORS: *Niobium, *Tantalum, Crystal lattice defects, Deformation, Stresses, Theory, Impurities, Mathematical models, Mathematical analysis, Tensile properties, X-ray diffraction analysis, Internal friction, Diffusion, Elasticity.

A theoretical model is developed based on dislocation-interstitial interaction during stress application, which describes the anelastic behavior of bcc metals particularly during yield delay. It is shown that the reorientation of interstitial impurities apparently controls both the pre-yield microstrain rate and the time to yield. The model is supported for tantalum and columbium by the results of yield delay experiments over a temperature range from -97 to 400 F. Activation energies of the yield delay

process calculated both from microstrain rate data and time-to-yield information indicate that hydrogen diffusion has a controlling effect, with other interstitials contributing to the effective activation energies at the higher temperatures. Temperature-insensitive stress effects are noted. A brief resume is given on the initial efforts of a high temperature study on the anelasticity in tantalum and columbium. This study is aimed at exploring anelastic behavior up to 3000 F. (Author)

AD-401 837 Div. 17, 27
(TISTM/BRW) OTS price $1.60

Aerojet-General Corp., Azusa, Calif.
INVESTIGATION OF STRESS-CORROSION CRACKING OF HIGH-STRENGTH ALLOYS.
Informal monthly progress rept. no. 21, 1-30 Jan 63,
by R. B. Setterlund and A. Rubin. Apr 63, 11p. incl. tables (Rept. no. L0414-01-21)
(Contract DA 04-495-ORD-3069)
Unclassified report

DESCRIPTORS: *Rocket cases, *Steel, *Titanium alloys, Stresses, Fracture (Mechanics), Aluminum alloys, Vanadium alloys, Nickel alloys, Heat treatment, Aging (Materials), Cold working, Corrosive gases, Corrosive liquids, Corrosion inhibition, Plastic coatings, Materials, Corrosion.

Data show that the 6Al-4V titanium alloy is immune to stress-corrosion cracking under all the test conditions of this program in both the annealed and in the quenched-and-aged conditions. The 20%-nickel maraging steel was found to be susceptible to stress corrosion cracking in both the annealed-and-aged and in the 75% cold-worked conditions. The susceptibility is much greater, however, in the annealed condition. The 18%-nickel maraging steel was also found to be susceptible to stress-corrosion cracking in both the annealed-and-aged and cold-worked-and-aged conditions. As with the 20%-nickel alloy the annealed and aged condition showed the greater susceptibility. (Author)

AD-401 841 Div. 17, 26
(TISTM/AM) OTS price $1.60

Armour Research Foundation, Chicago, Ill.
HIGH-TEMPERATURE OXIDATION PROTECTIVE COATINGS FOR VANADIUM-BASE ALLOYS.
Bimonthly rept. no. 3, 13 Jan-12 Mar 63,
by John J. Rausch. 8 Apr 63, 17p. incl. illus. tables (Rept. no. ARF-B6001-3)
(Contract N600(19)59182)
Unclassified report

DESCRIPTORS: *Vanadium alloys, *Metal coatings, *Niobium alloys, *Diffusion, Tantalum alloys, Hafnium alloys, Tungsten alloys, Sheets, Titanium alloys, Molybdenum alloys, Zirconium alloys, High temperature research, Heat-resistant metals and alloys, Antioxidants, Manufacturing methods, Processing, Silicon coating, Coatings.

Basic pack-siliconizing processing variables such as time, temperature, edge and surface preparation, activator concentration, and powder size are being investigated to optimize oxidation life and coating adherence for thin sheet material. Fifteen vanadium-columbium alloy compositions have been pack-siliconized and oxidation-tested. Minimum life has been established at about 150 hr at 2200 F for each of the alloys. (Author)

AD-401 844 Div. 17
(TISTM/BRW) OTS price $1.60

Keck, W. M. Lab. of Engineering Materials, Calif. Inst. of Tech., Pasadena.
SOLID SOLUTIONS IN COPPER-IRON ALLOYS,
by William Klement, Jr. Mar 63, 14p. incl. illus. table, 23 refs. (Technical rept. no. 13)
(Contract Nonr-22030)
Unclassified report

DESCRIPTORS: *Copper alloys, Iron alloys, Solids, Solutions, Crystal lattices, Solubility, X-ray diffraction analysis, Phase studies.

By rapidly quenching liquid alloys, single-phase Cu-rich solid solutions are obtained from 0 to 20 at.-% Fe. The plot of lattice spacings vs. composition exhibits a distinct maximum near 7.2 + or - 0.5 at.-% Fe and this extremum is tentatively associated with a magnetic transition. Body-centered cubic Fe-rich phases containing about 5 to 10 at.-% Cu coexist with face-centered cubic Cu-rich phases of rather widely varying compositions in the range, 20 to about 80 at.-% Fe. At least 10 at.-% Cu is retained in solid solution in the iron-rich phase, for which the lattice spacing increases by 1.1 + or - 0.0001 angstroms per at.-% Cu. (Author)

AD-401 915 Div. 17
(TISTM/AM) OTS price $2.25

Aerojet-General Corp., Downey, Calif.
INVESTIGATE THE EFFECT OF HIGH DYNAMIC PRESSURES UPON THE METALLURGICAL PROPERTIES OF IRON AND TITANIUM-BASE ALLOYS.
Final rept., 15 Apr 61-14 Apr 62 on Metallic Materials,
by A. W. Hall, E. K. Henriksen and others.
Feb 63, 186p. incl. illus. tables, 4 refs.
(Contract AF 33(616)8191, Proj. 7351)
(ASD TDR 62-535) Unclassified report

DESCRIPTORS: *Iron alloys, *Hot working, *Titanium alloys, X-ray diffraction analysis, Metallography, Hardness, Austenite, Deformation, Tensile properties, Heat treatment, Aging, Fracture (Mechanics), Mechanical properties, Shock (Mechanics), Shock waves, Microstructure, Dispersion hardening, High-pressure research.

Effects of high dynamic pressures upon the metallurgical properties of iron and titanium-base alloys are given. Pressure levels ranging from 86 kilobars to 390 kilobars were used to demonstrate refinement of structure with indications of ausforming in H-11 steel shocked at elevated temperature, a reduction in retained austenite for heat-treated and tempered UHB-46 steel, and an increase in susceptibility to aging for B120VCA titanium. Metallurgical examinations of shocked specimens were conducted optically, with X-ray diffraction and with electron microscopy. Changes in hardness, structure and dimensions were recorded and correlated with the pressures used. Hypotheses to explain the observed effects are presented. Details are presented pertinent to the explosive techniques developed for generating the dynamic shock, the recovery system employed to recover the specimens after shocking, and the problem areas associated with testing at elevated temperatures. (Author)

AD-402 015 Div. 17, 26
(TISTM/BRW) OTS price $1.60

Armour Research Foundation, Chicago, Ill.
DEVELOPMENT OF 2400 F FORGING DIE SYSTEM.

Interim technical progress rept., 28 Dec 62-27 Mar 63,
by H. Nudelman, T. Watmough and P. R. Gouwens.
Apr 63, 11p. incl. illus. tables.
(Contract AF 33(600)42861)
(ASD TR 7-886, vol. 8)
Unclassified report

DESCRIPTORS: *Heat resistant metals and alloys, *Dies, Tungsten alloys, Molybdenum alloys, Ceramic materials, Silicon compounds, Carbides, Oxidation, Coatings, Salts, Fluorides, Sodium compounds, Calcium compounds, Forging, Materials.

The prototype die has been assembled and heating experiments initiated. These indicated that with Calrod heating a die-face temperature of 1300 F can be obtained. This will be supplemented by gas-flame radiation heating on the die face to attain a temperature of 2400 F. Experiments utilizing calcium fluoride-sodium fluoride salt combinations to give oxidation protection to the refractory-metal die components were successfully performed. A spectrum of viscosities can be obtained with this salt combination by relatively minor adjustments in proportion of either of the components. (Author)

AD-402 089 Div. 17, 13
(TISTE/CRJ) OTS price $1.50

Naval Research Lab., Washington, D. C.
FRACTURE ANALYSIS DIAGRAM PROCEDURES FOR THE FRACTURE-SAFE ENGINEERING DESIGN OF STEEL STRUCTURES,
by W. S. Pellini and P. P. Puzak. 15 Mar 63, 53p. incl. illus. tables, 25 refs. (NRL rept. no. 5920)
Unclassified report

DESCRIPTORS: *Steel, *Fracture (Mechanics), Test methods, Tensile properties, Temperature, Structures, Stresses, Plasticity, Ductility, Elasticity, Brittleness, Deformation, Load distribution, Shear stresses.

A new procedure is described for the engineering design of fracture-safe steel structures representing weldments, forgings, castings, and combinations of these. The procedure is applicable to all steels which have distinct transition temperature features, i.e., excepting the ultrahigh-strength types which have poorly defined, low-slope Charpy V transition curves. The new procedure is based on the concept of the fracture analysis diagram, which represents a consolidation of the available knowledge concerning flaw size, stress, and temperature requirements for the initiation and propagation of brittle fractures. The bases for the development of the diagram are explained. Extensive failure and structural test data are provided as documentation of the validity of the described procedures. The practical engineering use of the fracture analysis diagram is based on the determination of a simple parameter — the NDT temperature of the steel. All other required information involves elements which are normal considerations in design of engineering structures. (Author)

AD-402 116 Div. 17, 14
(TISTM/AW) OTS price $1.10

Carborundum Co., Niagara Falls, N. Y.
A STUDY OF FUNDAMENTAL MECHANICAL PROPERTIES OF CERAMIC SINGLE CRYSTALS.
Bi-menthly progress rept. no. 1, 14 Jan-14 Mar 63,
by P. T. B. Shaffer and H. D. Batha. 25 Mar 63, 4p. incl. illus. table, 1 ref.
(Contract N600(19)59749)
Unclassified report

DESCRIPTORS: *Carbides, *Single crystals, Mechanical properties, Elasticity, Rupture, Thickness, Silicon.

Measurement of cross-bending strength and Young's modulus of pure silicon carbide was carried out on approximately 25 samples at room temperature. (Author)

AD-402 158 Div. 17
(TISTM/AM) OTS price $1.60

Horizons Inc., Cleveland, Ohio.
REINFORCEMENT OF NICKEL CHROMIUM ALLOYS WITH SAPPHIRE WHISKERS.
Interim rept. no. 2, 29 Dec 62-28 Mar 63,
by Robert H. Kelsey. 22 Apr 63, 13p. incl. tables.
(Contract NOw 63-0138-c)
Unclassified report

DESCRIPTORS: *Reinforcing materials, *Sapphires, *Ceramic fibers, Adhesion, Composite materials, Corundum, Nickel alloys, Chromium alloys, Iron, Stainless steel, Powder metals, Powder metallurgy, Oxides, Aluminum compounds, Bonding, Oxygen, Metal coatings, Single crystals.

It was shown that oxygen is required for the formation of a bond between iron and alumina whiskers. This oxygen may be introduced as naturally-occurring oxides on the surfaces of iron powder. Reinforcement was again demonstrated in iron-alumina whisker composites subjected to short heating cycles. Evidence was obtained that long heating cycles and excessive oxide content result in destructive attack on the alumina whiskers. (Author)

AD-402 161 Div. 17
(TISTM/AM) OTS price $1.10

General Dynamics/Convair, San Diego, Calif.
STRESS CORROSION SUSCEPTIBILITY FROM RIVET SWELLING.
Rept. on Material - Aluminum - 2024-T81 and 2024-T31 - Stretcher Levelled Plate,
by H. C. Turner and W. M. Sutherland. 17 Sep 58, 4p. incl. illus. (Rept. no. 8926-124)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Corrosion, *Stresses, Chlorides, Sea water, Solutions, Rivets, Metal plates, Aluminum alloys.

The tendency for the swelling of 2024-T31 aluminum alloy rivets, caused by gun driving them into holes in 2024-T81 stretcher-levelled aluminum alloy plates, to induce stress corrosion susceptibility in the plate material was checked by means of salt spray exposure and synthetic sea water alternate immersion tests. Stress corrosion cracking was not observed during testing, and stretcher levelling thus did not appear to induce stress-corrosion susceptibility in 2024-T81 plates. (Author)

AD-402 164 Div. 17
(TISTM/AM) OTS price $1.60

General Dynamics/Convair, San Diego, Calif.
EFFECT OF SURFACE FINISHES ON FATIGUE LIFE.
Rept. on Material - Steel, Alloy, 4340 - Aluminum, 2024-T3 and 7075-T6,
by E. K. Winslow, G. D. Lindeneau, and W. E. Wise.
9 Mar 59, 12p. incl. illus. tables, 3 refs.
(Rept. no. 8926-142)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Alloys, *Fatigue (Mechanics), Heat treatment, Life expectancy, Chemical milling, Coldworking, Machining, Steel, Aluminum alloys, Data, Stresses, Effectiveness.

Fatigue tests of 7075-T6 bare aluminum alloy in the as received condition, and 4340 steel in the machined, heat-treated (280,000 to 300,000 psi ultimate tensile strength) and stress-relieved condition showed that micro-glass peening promoted greater fatigue life than did vapor blasting. Fatigue life comparisons with the bare 2024-T3 aluminum alloy showed that machining did not result in change but chemical milling did, and micro-glass peening served to restore and improve the fatigue life of chemically milled surfaces. (Author)

AD-402 165 Div. 17
(TISTM/AM) OTS price $1.60

General Dynamics/Convair, San Diego, Calif.
CRACK PROPAGATION AND FATIGUE CHARACTERISTICS.
Rept. on Material - Aluminum - 2020-T6, 2024-T3 and 7075-T6,
by G. D. Lindeneau, E. Schiff, and W. E. Wise.
23 Feb 59, 15p. incl. illus. tables, 3 refs.
(Rept. no. 8926-143)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Aluminum alloys, *Fatigue (Mechanics), Mechanical properties, Failure mechanics, Stresses, Data.

Crack propagation tests were made with 20 wide by 40 in. long specimens of .079 thick 2020-T6, .0795 thick clad 2024-T3, .091 thick clad 2024-T3, .081 thick bare 7075-T6 and .091 thick clad 7075-T6 aluminum alloys. Initial 5-inch-long cracks were introduced into each specimen and crack growth was observed as it related to incremental load increases. The fracture work rate for crack propagation was calculated according to the formula $dW/dA = \sigma^2 \pi x/2E$ where σ = max. gross stress, x = crack length at max. load and E = modulus of elasticity. (Author)

AD-402 166 Div. 17
(TISTM/BRW) OTS price $2.60

General Dynamics/Convair, San Diego, Calif.
LITERATURE SURVEY.
Report on Material - Finishes and Coatings - Oxidation Resistant for Molybdenum,
by D. S. Pratt, E. Shoffner, and E. E. Keller.
25 June 59, 14p. incl. illus. table, 37 refs.
(Rept. no. 8926-145)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Molybdenum, High temperature research, Ceramic coatings, Cladding, Metal coatings, Refractory coatings, Silicon coatings, Aluminum coatings, Electrodeposition, Flame spraying, Vapor plating, Diffusion, Coatings.

Some of the advantages and disadvantages of chromium-base, molybdenum disilicide, nickel-alloy, precious metals and ceramic oxidation resistant coatings for molybdenum are discussed along with methods used for their application. The restriction of the use of the coatings discussed to applications involving only simple shapes is pointed out. (Author)

AD-402 169 Div. 17
(TISTM/AM) OTS price $1.60

General Dynamics/Convair, San Diego, Calif.
SPOT AND FUSION WELD FATIQUE CHARACTERISTICS.
Rept. on Material - Nickel Base Alloy - R-235,
by G. D. Lindeneau, E. Schiff, and W. E. Wise.
20 July 59, 9p. incl. illus. tables, 1 ref.
(Rept. no. 8926-148)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Nickel alloys, *Thermal joining, *Welds, *Fatique, Failure (Mechanics), Life expectancy, Aging (Materials), High-temperature research, Data, Spot welds.

The fatigue of 10% cold-worked and aged (1500 F) Haynes Stellite Co., R-235 nickel-base alloy spot-weld lap and fusion-weld butt joints was determined at room temperature and 1500 F with a 4/9 test ultimate strength maximum fatigue load. Spot welds were tested in thickness combinations of 0.020 to 0.020, 0.020 to 0.040 and 0.040 to 0.063 in., and fusion weld thickness combinations were 0.016 to 0.016, 0.040 to 0.040 and 0.063 to 0.063 in. Fatigue life data are given. (Author)

AD-402 171 Div. 17
(TISTM/AM) OTS price $1.60

General Dynamics/Convair, San Diego, Calif.
EFFECT OF HEATING ALUMINUM ALLOY WING STRUCTURE TO 325 F ON THE MECHANICAL PROPERTIES OF ITS COMPONENT MATERIALS.
Report on Material - Aluminum - 2024-T3, 2024-T4, 7178-T6,
by P. W. Bergstedt, H. C. Turner, and W. M. Sutherland. 7 July 59, 9p. incl. illus. tables.
(Rept. no. 8926-150)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Wings, *Heat treatment, *Aluminum alloys, Deformation, Sheets, Extrusion, Mechanical properties.

The Convair Model 22 subsonic jet transport airplane wing is subjected to a heating cycle which consists of heating from room temperature to 325 F in 3 hours, holding at 325 F for one hour and cooling to room temperature f from 325 F in 4 hours. Such a heating cycle is representative of the heating encountered in an initial Mach 2 plus supersonic flight. This heating, representing an initial cycle caused (1) a reduction of 15.3% of yield strength in clad 2024-T3 aluminum alloy sheet; (2) a 5.4% reduction in the yield strength of 2024-T4 extrusion; (3) up to 6% reduction in the yield strength of clad 7178-T6 sheet; and a 4.1 reduction in the yield strength of 7178-T6 extrusion. The ultimate strength and elongation of the 2024 alloys were slightly affected by the heating; but the ultimate strengths and elongations of the 7178 alloys underwent changes indicative of slight overaging. (Author)

AD-402 172 Div. 17
(TISTM/AM) OTS price $1.10

General Dynamics/Convair, San Diego, Calif.
EFFECT ON STRETCH STRAIGHTENING ON MECHANICAL PROPERTIES.
Report on Material - Aluminum - 7075-T6,
by P. W. Bergstedt, H. C. Turner, and W. M. Sutherland. 16 Nov 59, 6p. incl. illus. tables.
(Rept. no. 8926-152)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Aluminum alloys, *Stresses, *Stretch forming, Aging (Materials), Deformation, Compressive properties, Tensile properties, Mechanical properties, Data, Rods, Heat treatment.

Stretching 1 x 1-1/4 x 60 extruded 7075 aluminum alloy bars in the as-quenched condition 0.78, 1.74, 1.94 and 2.65 per cent reduced the distortion resulting from machining 82, 78, 86 and 82%, respectively, in comparison with the distortion resulting from machining an ''un-stretched'' bar. The mechanical properties resulting from stretching and then aging to produce the 7075-T651 condition are tabulated. (Author)

AD-402 333 Div. 17
(TISTM/BRW) OTS price $10.50

Battelle Memorial Inst., Columbus, Ohio.
FURTHER INVESTIGATION OF NOTCH SENSITIVITY OF REFRACTORY METALS.
Rept. for 1 Oct 61-31 Aug 62 on Metallic Materials.
Dec 62, 128p. incl. illus. tables, 32 refs.
(Contract AF 33(616)7604, Proj. 7351)
(ASD-TDR-62-1004) Unclassified report

DESCRIPTORS: *Molybdenum, *Molybdenum alloys, *Niobium, *Tantalum, *Tungsten, Cold working, Heat treatment, Recrystallization, Tensile properties, Ductility, Brittleness, Transition temperature, Fracture (Mechanics), Low temperature research, Heat resistant metals and alloys, Stresses, Deformation, Hardness, Titanium alloys, Grain structures (Metallurgy), Mechanical properties.

Molybdenum and Mo-0.5Ti alloy with various degrees of cold work and different recrystallized grain sizes were tested to determine their low-temperature properties. Sufficient cold work (>25 per cent; about 68 per cent is sufficient) markedly reduced the ductile-to-brittle transition temperature of both materials, whereas increasing the recrystallized grain size increased this parameter. Mechanical notches resulted in pronounced degradation of properties in fibered structures, but were much less detrimental to recrystallized structure. This behavior was attributed to the controlling (detrimental) effect of grain boundaries in the fracture of recrystallized molybdenum or Mo-0.5Ti, regardless of material geometry. The fracture toughness of unalloyed molybdenum, tungsten, tantalum, and columbium was studied over a range of temperatures chosen to include the ductile-brittle transition. Both wrought and recrystallized conditions were examined for each material. (Author)

AD-402 355 Div. 17
(TISTM/AM) OTS price $1.60

General Electric Co., West Lynn, Mass.
HYDRODYNAMIC COMPRESSIVE FORGING.
Interim technical engineering rept., 9 Oct 62-9 Apr 63,
by Richard M. Cogan. Apr 63, 21p. incl. illus. tables.
(Contract AF 33(657)8793)
(ASD TR 7-890, vol. 2) Unclassified report

DESCRIPTORS: *Forging, *Hydrostatic pressure, *Aluminum, Lubricants, Bismuth alloys, Lead, High pressure research, Deformation, Dies, Hydraulic pressures, Compressive properties.

Hydrodynamic Compressive Forging of Commercial pure aluminum with an upset ratio of 19:1 was achieved in one operation at room temperature. The outside edge of the formed part remained square with the face throughout the forming operation. The maximum upset ratios were obtained with back pressure in the cavity in excess of the work-hardened tensile strength. The hydrodynamic compressive die with inserts was designed and built to withstand operating pressures of 600,000 psi at room temperature. The maximum applied load so far has been 540,000 psi, or 90% of the design limit (Author)

AD-402 405 Div. 17, 10, 27
(TISTM/EJH) OTS price $1.60

Phillips Petroleum Co., Bartlesville, Okla.
GAS TURBINE AND JET ENGINE FUELS.
Bimonthly progress rept. no. 5, Dec 62-Jan 63, by W. L. Streets. 4 Apr 63, 17p. incl. tables, 5 refs. (Research div. rept. 3449-63R)
(Contract N600(19)-58219)
Unclassified report

DESCRIPTORS: *Jet engine fuels, *Jet engines. *Nickel alloys, *Cobalt alloys, *Corrosion, Corrosion inhibition, Chromium alloys, Sulfur compounds, Carbon, Dioxides, Magnetic properties, Sea water, Salts, Air, Contamination, Heat resistant metals and alloys.

Efforts were directed to a bench-scale study of sulfur corrosion of the type known colloquially as ''black plague''. Superalloys, including Udimet 500, Rene 41, Hastelloy R-235, Waspalloy and Haynes Alloy 25, have been evaluated. These tests were carried out at 2000 F with various combinations of air, sulfur dioxide, carbon and sea salts present. Results indicated that: metal loss is not a wholly reliable index to degree of attack; degree of attack is potentially catastrophic; of the individual corrodents, only sea salt increased the attack above the ''air only'' baseline; effect of sea salt alone and in combination with carbon and/or SO2 was specific to alloy type; carbon, as a possible reducing agent for protective chromium oxide films, was confirmed as detrimental to all the alloys in tests with SO2 and air; carbon accelerated sea salt corrosion in three of the alloys and markedly inhibited sea salt corrosion of the other two alloys; when sulfur was present as both sea salts and SO2 (no carbon) results varied from mild acceleration by the added SO2 with Udimet 500 to pronounced inhibition with Rene 41, although the R-41 was still badly corroded; when carbon was included while supplying both SO2 and sea salts the attack was accelerated except for Rene 41 where, again, attack was apparently inhibited by the carbon and SO2; except for R-41, corrosion was catastrophic with air + carbon + SO2 + sea salt. (Author)

AD-402 431 Div. 17, 25
(TISTM/AMS) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PROBLEMS IN PHYSICS OF METALS AND METAL STUDIES (SELECTED ARTICLES).
26 Mar 63, 14p. incl. illus. refs. (Trans. no. FTD-TT-63-48 from Russian Book, Voprosy Fiziki Metallov I Metallovedeniya, Kiev, No. 14, pp. 116-120, 147-151, 1962)
Unclassified report

DESCRIPTORS: *Metallurgy, *Phase studies, Heat treatment, Steel, Austenite, Heating, Time, Temperature, Martensite, Crystals, Copper alloys, Tin alloys, Aluminum alloys, Nickel alloys, Transformation, Nucleation, Transition temperature.

18. MILITARY SCIENCES AND OPERATIONS

AD-401 226 Div. 18
(TISTP/PCR) OTS price $26.00

Hudson Inst., Harmon-on-Harmon, N. Y.
STRATEGIC AND TACTICAL ASPECTS OF CIVIL DEFENSE WITH SPECIAL EMPHASIS ON CRISIS SITUATIONS.
Final rept.,
by William M. Brown. 7 Jan 63, 1v. incl. illus. tables (Rept. no. HI-160-RR)
(Contract OCD-OS-62-18)
Unclassified report

DESCRIPTORS: *Civil defense systems, Transportation, Shelters, Ventilation, Water, Food, Medical supplies, Medical personnel, Command and control systems, Strategic warfare.

This report is structured in the manner set forth below to consider some crisis aspects of civil defense systems: Chapter I, methodological considerations, Chapter II, general context for crisis planning, Chapter III, strategic aspects of civil defense, Chapter IV, civil defense tactics in crisis situations, Chapter V, a preliminary feasibility study of one civil defense tactic. The report attempts to (1) provide a broad context for civil defense; (2) give specific hints and directions towards possible solutions of some important civil defense problems; and (3) study the feasibility of one specific civil defense tactic (i.e., strategic evacuation). (Author)

AD-401 346 Div. 18, 32
(TISTB/AW) OTS price $8.10

Technical Military Planning Operation, General Electric Company, Santa Barbara, Calif.
FUTURE NAVY SYSTEMS, VOLUME I. INTRODUCTION TO POLITICAL-MILITARY ENVIRONMENT OF WARFARE.
31 Dec 61, 83p. incl. illus. tables, 29 refs.
(Rept. no. RM-61-THP-95)
Unclassified report

DESCRIPTORS: *Navy, *Population, *Warfare, *Political science, Cold war, Communism, Nuclear warfare, Limited war, Foreign policy, Geography, Economics, Military requirements, National Defense, Distribution.

The TEMPO Future Navy Systems study is an across-the-board examination of sea warfare missions and seaborne weapon systems. Military missions and naval weapon systems have been studied in the context of the contribution of each system to the various missions, the competition between systems, and the impact of budgetary and other constraints. The results of the work are published in two volumes. This first volume examines the broad political, military, and geographic background of war, in order to obtain an overview of the global environment that leads to military missions and military force requirements. Volume II applies the perspectives gained by the study to each of the major combatant elements of the Navy. (Author)

AD-401 415 Div. 18
(TISTB/AW) OTS price $2.60

Air Force Academy, Colo.
UNCONVENTIONAL WARFARE. PART III. ESCAPE AND EVASION.
Feb 63, 26p. refs. (Special bibliography series no. 23)
Unclassified report

DESCRIPTORS: *Evasion, *Bibliographies, Prisoners of war.

This is the third bibliography in a series dealing with the general topic of unconventional warfare. Part I dealt with guerrilla warfare, while Part II treated psychological warfare. Items listed in previous parts of the series have not been relisted. A fourth bibliography dealing with propaganda will be published shortly. The bibliography represents a selected portion of the holdings of the Air Force Academy Library on this subject. There are six sections: World War I escapes; World War II - German prison camps; World War II - Japanese prison camps; World War II - Allied prison camps, Korean war; and General references. (Author)

AD-402 285 Div. 18
(TISTB/AW) OTS price $1.10

RAND Corp., Santa Monica, Calif.
SOME RAMBLINGS AND MUSINGS ON TACTICAL RECONNAISSANCE,
by Amrom H. Katz. Mar 63, 7p. (Rept. no. P-2722)
Unclassified report

DESCRIPTORS: *Aerial reconnaissance, Limited war, Armed forces operations, Test methods, Military requirements, Warfare.

AD-402 286 Div. 18, 32
(TISTB/AW) OTS price $2.60

RAND Corp., Santa Monica, Calif.
THE MILITARY ROLE IN SPACE -- A SUMMARY OF OFFICIAL, PUBLIC JUSTIFICATIONS,
by Robert H. Puckett. Aug 62, 29p. 48 refs.
(Rept. no. P-2681)
Unclassified report

DESCRIPTORS: *National defense, *Astronautics, Satellites (Artificial), Armed forces operations, Research program administration, Political science.

AD-402 376 Div. 18, 30
(TISTM/EJH) OTS price $1.10

Naval Civil Engineering Lab., Port Hueneme, Calif.
RUSTED COMPONENTS OF MATERIEL IN STORAGE,
by J. C. King. 5 Sep 62, 1v. incl. illus. tables (Technical note no. N-464)
Unclassified report

DESCRIPTORS: *Storage, *Degradation, Corrosion, Humidity, Machines, Machine tools, Internal combustion engines, Gears, Brakes, Electrical equipment, Vehicles, Preservation, Controlled atmosphere, Fuel systems, Bearings, Test methods.

The Naval Civil Engineering Laboratory has concluded a 5-year storage test program to determine the type of environment and preservation level best suited for long term storage of materiel under the Bureau of Yards and Docks technical cognizance. Results of the test show that protection is poor in open-air storage, fair in a shed, good in the standard warehouse, and excellent in the controlled humidity warehouses. Five components -- internal-combustion engines, gear boxes, fuel-injector sets, hydraulic brake systems, and cooling systems -- had a high incidence of rust regardless of storage environment and with little regard to preservation level. Compared to domestic treatment, contact preservation decreases rust incidence about 58% for open air, 44% for the shed and 30% for the standard warehouse; no rust due to storage environments occurred in the controlled-humidity warehouses for either preservation level. (Author)

Division 19 - NAVIGATION

19. NAVIGATION

AD-401 581 Div. 19
(TISTP/FR) OTS price $4.60

Institute of Science and Tech., U. of Michigan, Ann Arbor.
STUDY AND ANALYSIS OF SELECTED LONG-DISTANCE NAVIGATION TECHNIQUES. VOLUME I: SUMMARY.
Final rept., 21 Sep 61-31 July 62,
by James O'Day, Irvin Sattinger and others.
Dec 62, 32p. incl. tables, 3 refs. (Rept. no. 4761-10-F(1))
(Contract ARDS-436)
Unclassified report

DESCRIPTORS: *Navigation aids, *Navigation, Gyroscopes, Radio navigation, Very low frequency, Hyperbolic navigation, Navigation satellites, Effectiveness.

The state-of-the-art and the development potential of heading references, VLF radio systems, inertial techniques, and satellite systems are considered for their applicability to long-range, ocean-crossing, nonmilitary aircraft from 1965 to 1975. The navigation systems discussed are by no means the only competitors for position and course determination over transoceanic and high-altitude transcontinental regions; the included data and information should permit further comparison with other systems. (Author)

AD-401 648 Div. 19
(TISTP/FEM) OTS price $1.75

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
THEORETICAL INVESTIGATION OF A MAGNETO-OPTICAL GYROSCOPE. FARADAY AND TRANSIT-TIME EFFECTS.
Final rept., vol. 1, Nov 60-Oct 61,
by Richard B. Rothrock. Feb 63, 65p. incl. illus. 29 refs. (Rept. no. ESL-T-125, vol. 1)
(Contract AF 33(616)7668, Proj. 4431)
(ASD TDR-62-492, vol. 1) Unclassified report

DESCRIPTORS: *Gyroscope, Inertial guidance, Microwave equipment, Sensitivity, Resolution, Signal-to-noise ratio, Magnetic fields, Shielding, Resonance, Polarization, Trigonometry, Functions, Matrix algebra, Wave transmission, Magnetometer, Ferromagnetism, Chemical compounds, Mirrors, Magneto-optic effect.

A study of magneto-optical and other closely related phenomena is presented. The sensitivity of these phenomena to angular motion is studied in order to ascertain the feasibility of a magneto-optical gyroscope. The three phenomena studied are: (1) the optical Faraday effect, (2) the microwave Faraday effect, and (3) transit-time effects. Angular motion sensing instruments would utilize either of the first two effects in combination with the third. Throughout these studies it is assumed that the output signal is generated in response to the rotation of the plane of polarization of the detected radiation relative to that of the incident radiation. It is found that the transit-time effects produce little rotation of the plane polarization, for a given angular rate, compared with that produced by the Faraday effect. Estimates for angular motion sensors that employ the optical and microwave Faraday effects show that the resolutions that could be expected, after considerable development, would be of the order of 0.1 radian per second. To get this resolution magnetic fields must be shielded from the device so that field fluctuations are kept down to the order of 10 to the minus 9th power gauss. In view of this low resolution and high sensitivity to stray magnetic fields, magneto-optical gyroscopes based on the Faraday effect do not seem to be a fruitful area for further research. (Author)

AD-401 671 Div. 19
(TISTP/WH) OTS price $18.00

Institute of Science and Tech., U. of Michigan, Ann Arbor.
STUDY AND ANALYSIS OF SELECTED LONG-DISTANCE NAVIGATION TECHNIQUES. VOLUME II.
Final rept., 21 Sep 61-31 July 62,
by James O'Day, Irvin Sattinger and others.
Mar 63, 271p. incl. illus. tables, 100 refs.
(Rept. no. 4761-10-F, vol. 2)
(Contract ARDS-436)
Unclassified report

DESCRIPTORS: *Navigation, Celestial navigation, Doppler navigation, Inertial navigation, Magnetic navigation, Radio navigation, Aircraft.

The state of the art and the development potential of heading references, VLF (very-low-frequency) radio systems, inertial techniques, and satellite systems were considered for their applicability to long-range ocean-crossing nonmilitary aircraft from 1965 to 1975. The navigation systems discussed here are by no means the only competitors for position and course determination over transoceanic and high-altitude transcontinental regions; our data and information should permit further comparison with other systems. It is concluded that magnetically slaved and good free gyroscopes will continue to be the principal heading references for commercial aircraft; improvement programs in magnetic compasses and the use of nonfloated friction-averaging gyros are recommended. In their present form inertial systems are competitive with doppler navigation systems, at least in accuracy. The present configuration of TRANSIT, the only satellite reference system scheduled for implementation, exhibits time gaps which would be serious for aircraft use. The single-fix accuracy appears to be adequate if additional satellites are orbited to provide more frequent fixes. (Author)

AD-401 913 Div. 19
(TISTP/FEM) OTS price $2.25

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
THEORETICAL INVESTIGATION OF A MAGNETO-OPTICAL GYROSCOPE. ALTERNATIVES TO THE FARADAY EFFECT.
Final rept., Nov 60-Apr 62.
Feb 63, 78p. incl. illus. tables, 25 refs.
(Rept. no. ESL-R-125, vol. 2)
(Contract AF 33(616)7668, Proj. 4431)
(ASD TDR 62-492, vol. 2) Unclassified report

DESCRIPTORS: *Gyroscopes, *Magneto-optic effect, Theory, Colloids, Particle trajectories, Inertial guidance, Magnetic fields, Shielding, Resolution, Moments, Nuclear particles, Nuclear moments, Nuclear spins, Nuclear resonance, Differential equations.

A theoretical investigation of the feasibility of using magneto-optical and certain other physical phenomena for gyroscopic measurement purposes is summarized. The phenomena investigated in this report are nuclear angular momentum effects, Coriolis force effects on various particles and bulk fluid effects. This report supplements Report ESL-R-125-(I). The conclusions reached are as follows. The magneto-optical gyroscope, based on the Barnett and Faraday effects, is potentially capable of a resolution on the order of 0.1 radian per second providing stray magnetic field effects are shielded to maintain field fluctuations down to the order of 10 to the -9th power gauss. Methods based on nuclear angular momentum may be able to achieve one to three orders of magnitude more resolution with less sensitivity to stray

fields than the magneto-optical approach. Maser techniques would be needed to reach the lower limit on resolution. Coriolis force effects in specially constructed dielectrics appear to be too small in comparison with other forces to be useful. This conclusion applies to both microscopic and colloidal particle sizes. (Author)

20. NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-401 113 Div. 20, 4
(TISTM/TCG) OTS price $9.10

Denver Research Inst., Colo.
BASIC STUDIES ON RADIATION ENERGY TRANSFER MECHANISMS OF CHEMICAL SYSTEMS,
by George E. Bohner. Dec 62, 95p. incl. illus. tables, 53 refs.
(Contract DA 44-177-tc-725)
(TREC 62-90) Unclassified report

DESCRIPTORS: *Radiation chemistry, *Chemical reactions, *Energy, *Organic compounds, Decomposition, Free radicals, Additives, Inhibition, Radiation effects, Polymerization, Chromatographic analysis, Organic solvents, Theory, Transformations, Organic compounds, Others.

Some organic compounds are able to protect others from degradation while under the influence of high-energy irradiation. Cyclohexane was chosen as the solvent to be studied, with benzene, biphenyl, and nephthalene being the principal protecting additives. By identifying the various products formed in these solutions and determining the influence of dose and additive concentration on the rate of formation of the products, certain conclusions regarding the radiolytic degradation mechanisms can be made. The formation and subsequent reactions of radiolytically formed free radicals cause most of the degradation observed in pure cyclohexane. When an aromatic additive is present, it reacts with these radicals and competes with the normal degradation reactions. Experimental results can be explained in terms of free radical mechanisms. A reaction degradation scheme is proposed which is consistent with the experimental results. (Author)

AD-401 196 Div. 20, 16
(TISTP/FEM) OTS price $1.60

Talco Engineering Co., Inc., Hamden, Conn.
RAPID ESTIMATION OF RESIDUAL RADIATION DOSAGE,
by S. R. Woods. Apr 63, 16p. incl. illus. 6 refs. (Technical memo. TAC OA TM-121)
Unclassified report

DESCRIPTORS: *Radiation effects, *Radioactive fallout, *Radiation hazard, *Radiological dosage, Radioactive decay, Exposure, Detonations, Time, Shelters, Dosage, Nomograph, Dose rate.

A simple and rapid means for estimating the total radiation dose one might expect to receive during exposure in an area contaminated by fission products is presented. Curves are included for exposure periods of 2, 4, 8, 12, and 16 hours and for accumulated doses of 50, 100, and 200 rem. In addition to the curves covering particular exposure periods, a special curve is included for estimating the dose for any period of exposure between 1 and 1,000 hours after detonation. A nomogram is included for converting radiation intensity measured at a particular time after detonation to the reference dose rate at one hour after detonation (H+1). Typical problems and their solutions are given in the body of the memorandum to familiarize the reader with the use of the nomogram and the curves. It must be borne in mind that the nomogram and the curves are based on the simple decay rate equation for normal fission products, I sub t = (I sub 1) (t to the negative 1.2 power), where I sub t is intensity in roentgens per hour (r/hr) at t hours after burst, and I sub 1 is intensity at one hour after burst (H + 1). Fractionation among fission products and induced activities may cause the decay rate in a particular fallout situation to vary considerably (50% or more) from that of the approximate t to the negative 1.2 power function. (Author)

AD-401 210 Div. 20
(TISTB/AW) OTS price $17.50

General Dynamics, Fort Worth, Tex.
AERIAL MONITORING SYSTEM STUDY.
Final rept.,
by L. G. Worthington, O. W. Wood and others.
27 Feb 63, 273p. incl. illus. tables (Rept. no. FZM-2822)
(Contract OCD-OS-62-275)
Unclassified report

DESCRIPTORS: *Radiation monitors, *Health physics instrumentation, Radiological contamination, Collecting methods, Airplanes, Radioactive fallout, Flight, Nuclear explosions, Data processing systems, Facsimile transmission, Teletype systems, Digital systems, Costs, Airborne, Mapping.

Flight procedures and design requirements for instrumentation for making aerial radiological surveys were developed. It is concluded that an aerial monitoring system designed with presently available components is not only feasible but also practical to monitor fallout from nuclear incidents. A recommended system which was selected on the basis of cost and response time is described in considerable detail. Radiation fallout patterns, expected number and location of burst points, wind effects, and local anomalies are considered in connection with aircraft range, speed, and basing constraints to develop flight procedures for making a survey of the U.S. or of fallout of a single burst. Sensor design is based upon the capability to measure ground radiation levels between 1 Rhr and 1000 R/hr from altitudes above 1000 feet in the presence of airborne activity. Facsimile, teletype, and digital systems are considered for the data system to provide the national center with geographical position and time referenced radiological data with which contour maps can be constructed. (Author)

AD-401 224 Div. 20
(TISTP/JW) OTS price $3.60

Quartermaster Food and Container Inst. for the Armed Forces, Chicago, Ill.
THE ROLE OF RECIPROCITY IN THERMAL RADIATION DAMAGE,
by Eugene S. Cotton. 25 Feb 63, 34p. incl. illus. (Rept. no. T-36)
(DASA-1350) Unclassified report

DESCRIPTORS: *Thermal radiation, Inequalities, Materials, Radiation effects, Pulse modulation, Damage.

The origin of the reciprocity condition in experimental studies is briefly examined and its significance in thermal radiation studies is considered. Theoretical calculations on semi-infinite and insulated-slab heat-flow models

in one dimension are presented as a guide for later considerations. Experimental data are presented which were obtained by exposing five different types of material to radiation from the carbon-arc and solar furnace imaging sources. These data are then analyzed for their reciprocity ''failures''. The method of thermal data presentation which plots the log of critical exposure level against log of pulse length is general enough for data comparison and some behavior identification. Also, the use of a theoretical criterion such as achievement of an arbitrary maximum temperature yields valuable insight into reciprocity deviations. Most materials cannot usually be expected to show reciprocity over the normal range of pulses used in thermal radiation studies. An application of the empirical approach which would make it possible to create useful thermal simulators can be based on the reciprocity behavior, and the success of simulation can be measured by similar curves of critical exposure versus pulse duration. (Author)

AD-401 308 Div. 20
(TISTP/WH) OTS price $1.10

Minnesota Mining and Mfg. Co., St. Paul.
PROTOTYPE TESTING OF PROPOSED RADIATION SOURCE FOR OCD DEMONSTRATION KIT CDV-457.
Final rept.
15 Mar 63, 11p. incl. illus. tables.
(Contract OCD-OS-62-238)
Unclassified report

DESCRIPTORS: *Beta particles, *Gamma rays, Strontium, Cesium, Sources.

The purpose of the program was to design and test a beta-gamma source for use in the CDV-457 training kit. The design proposed is shown. Ten sources were prepared according to this design, six of which were subjected to one or more destructive tests. The other four were submitted to the OCD for their inspection and evaluation. The source integrity is such that, even when the sources were subjected to the very rigorous destructive tests, none of them released as much as 0.005 microcuries of radioactivity to the environment. The data obtained from the prototype tests should be very instrumental in obtaining favorable action from the AEC on wipe relief. (Author)

AD-401 373 Div. 20
(TISTP/WH) OTS price $1.60

Weizmann Inst. (Israel).
THE THREE BODY PROBLEM IN ATOMIC PHYSICS.
Final rept., 21 Feb 61-20 Feb 63,
by C. L. Pekeris. 21 Feb 63, 11p.
(Contract AF 61(052)510)
(AFOSR-4577) Unclassified report

DESCRIPTORS: *N-body problem, *Quantum mechanics, Hyperfine structure, Atomic energy levels, Helium, Nuclear physics.

A summary of several investigations in two-electron spectroscopy are summarized: The $2^1S - 2^1P$ Line in Li^+, Fine Structure of the 2^3P and 3^3P States of Helium, Bound States of the Negative Hydrogen Ion, Hyperfine Structure of the 2^3S State of Helium, Lower Bounds of the 1^1S and 2^3S States of Helium, Excited S-States of Helium. (Author)

AD-401 643 Div. 20
(TISTP/FEM) OTS price $8.10

Geotechnical Corp., Garland, Tex.
ARMADILLO.
Final rept.
30 July 62, 1v. incl. illus. tables.
(Contract AF 33(600)41694, Proj. VT/074)
(NP-12445) Unclassified report

DESCRIPTORS: *Detonations, *Shock waves, Signal-to-noise ratio, Power, Density, Signals, Attenuation, Explosions, Explosion effects, Tables, Phase measurement, Velocity.

Information pertaining to travel times and amplitudes of the principle phases generated by the ARMADILLO detonation is presented in tabular and graphic form. A tentative interpretation of the data is made in the hope of providing avenues of further research. These interpretations should be considered as one of several hypotheses available for explaining the anomalies in LRSM data. (Author)

AD-401 687 Div. 20
(TISTP/WH) OTS price $13.50

Stanford Research Inst., Menlo Park, Calif.
RADIOLOGICAL MONITORING: CONCEPTS AND SYSTEMS,
by Richard B. Bothun and Richard K. Laurino.
Feb 63, 180p. incl. illus. tables, 18 refs.
(Contract OCD-OS-62-135)
Unclassified report

DESCRIPTORS: *Radioactive fallout, *Dosage, *Radiation monitors, Instrumentation, Radiation effects, Measurement, Civil defense systems.

Guidelines for design of radiological monitoring systems were developed from an analysis of the radiological information requirements over time of the principal organizational elements of civil defense, with respect to the emergency and recovery phases. Constraints on the design criteria of both fixed and mobile systems were defined as dictated by the information which they must provide. Fixed monitoring systems were studied with respect to station spacing, intensity reporting levels, accuracy of equipment, and related design specifications. The operational constraints and the techniques of deployment of mobile systems were also considered. Specifications of instrument accuracy were developed from considerations of both the accuracy with which dose can be related to the biological effect and the precision of radiological information required to support civil defense operations. The functions of monitoring instruments within shelters were reviewed, and their requirements for accuracy and range were developed. Initial investment and annual operating costs were estimated for selected systems. (Author)

AD-401 754 Div. 20
(TISTP/FEM) OTS price $1.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
A NUMERICAL METHOD FOR THE RADIATION TRANSPORT EQUATION IN PLANE GEOMETRY,
by B. E. Freeman. 22 Jan 62, 19p. incl. illus.
(Rept. no. GAMD-2874)
(Contract AF 29(601)2207, Proj. 52.01)
Unclassified report

DESCRIPTORS: *Reaction kinetics, *Transport properties, Geometry, Functions, Differential equations, Integral equations, Energy, Materials, Stability, Difference equations, Partial differential equations, Density, Temperature, Time, Equations.

Development of a numerical method for performing time dependent calculations of radiative energy transport through slabs is reported. Of guiding interest has been the retaining of contact with the diffusion approximation by maintaining a parallel of numerical methods. In doing so, it has been found that the radiation intensity may effectively be eliminated from the equations and from computer storage. As is the case in the diffusion approximation, only the material temperature remains. Conservation of energy is also a direct consequence of the method. However, to accomplish this objective a number of simplifications have been made which may limit the possibility of generalizing the method. (Author)

AD-401 756 Div. 20
(TISTP/FEM) OTS price $1.10

General Atomic Div., General Dynamics Corp., San Diego, Calif.
SOME APPROXIMATIONS IN THE NUMERICAL TREATMENT OF RADIATION TRANSPORT THROUGH MEDIA WITH FREQUENCY-DEPENDENT ABSORPTION COEFFICIENTS,
by B. E. Freeman. 1 Apr 62, 8p. (Rept. no. GAMD-3074)
(Contract AF 29(601)2207, Proj. 52.200)
Unclassified report

DESCRIPTORS: *Electromagnetic waves, *Reaction kinetics, Absorption, Frequency, Integral equations, Functions, Temperature, Density, Penetration, Attenuation.

An investigation into the properties of a numerical treatment of the transport of radiation through slabs of material is extended. Although the integral formulation of the energy change equation is retained, the method is made applicable to a medium having a frequency-dependent absorption coefficient rather than the frequency-independent one assumed in the grey-atmosphere approximation. (Author)

AD-402 108 Div. 20
(TISTP/MFA) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
PRELIMINARY DOSE MEASUREMENTS ON THE NEUTRON GENERATOR,
by Paul J. Ebert and Ronald W. Benson. Mar 63, 6p. incl. illus. 9 refs. (Rept. no. SAM-TDR-63-18)
Unclassified report

DESCRIPTORS: *Cockroft-Walton accelerators, *Dosage, *Neutron flux, Particle accelerators, Neutrons, Ion bombardment, Nuclear reactions, Particle accelerator targets, Isotopes, Deuterium, Tritium, Detectors, Count-rate meters, Particle accelerator techniques, Helium, Neutrons, Measurement, Deuterons.

Neutron fluxes are produced by the neutron generator at the USAF School of Aerospace Medicine, using the d(d,n)He3 and T(d,n)He4 reactions. An experimental procedure for determining the flux produced by the d(d,n)He3 reaction is presented. (Author)

AD-402 121 Div. 20, 7
(TISTP/PCR) OTS price $4.60

Ion Physics Corp., Burlington, Mass.
POWER SOURCES FOR DIRECTED ENERGY WEAPONS.
Quarterly rept. no. 6.
Apr 63, 39p. incl. illus. tables, 9 refs.
(Contract AF 08(635)2166, Proj. 3805)
(ASD TDR 63-14) Unclassified report

DESCRIPTORS: *Power supplies, *Radiation weapons, Advanced weapons, Superconductors, Coils, Thermal switches, Low-temperature research, Energy management, Storage, Inductance, Vacuum apparatus, Space weapons, Plasma physics, Cryogenics.

A discussion is given of initial test results obtained on a superconducting toroidal coil and a thermal discharge switch. Critical currents of the toroid are very high at low fields but considerable current degradation was observed at fields in the order of 15 kilogauss. Initial test results on the thermal switch indicate that the time required for a thermal transition is rather long (1/2 sec). More tests are to be performed, including an investigation of magnetic transitions. Some discharge experiments have been performed. Low energy discharge pulses with a rise time in the order of 2 msec have been obtained. (Author)

AD-402 147 Div. 20
(TISTP/FEM) OTS price $2.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
CALCULATION OF RADIATION DOSE LEVELS FOR THE ARMY PULSE EXPERIMENTAL REACTOR ASSEMBLY,
by Frederick H. Gregory. Nov 62, 31p. incl. illus. tables, 25 refs. (Memo. rept. no. 1438)
(DA Proj. no. 512-10-001)
Unclassified report

DESCRIPTORS: *Nuclear reactors, Dose rate, Shielding, Contamination, Radiation tolerance, Neutrons, Gamma emission, Photons, Absorption, Integral equations, Monte Carlo method, Radiation hazards.

Calculations are made to estimate, as a function of distance, the radiation dose levels which would occur during full capacity operation of the Army Pulse Reactor Assembly (APRA) scheduled for construction at Aberdeen Proving Ground, Maryland. Calculations of the neutron dose are made by two methods. The first calculation (Method A) is made by utilizing an experimentally determined effective dose mean free path, which probably includes the effect of ground scattering. The second calculation (Method B) is made by utilizing the result of a Monte Carlo calculation of neutron transmission in air. The results of this calculation indicate considerably higher dose levels than indicated by Method A. Experimental data are available which substantiate the result of Method A. The gamma dose at distances of interest is found to be unimportant when considered in light of the uncertainty in the neutron dose. (Author)

AD-402 159 Div. 20
(TISTP/WH) OTS price $2.60

Maryland U., College Park.
SINGLE-NUCLEON DAMPING OF COLLECTIVE VIBRATIONS,
by Richard A. Ferrell. Nov 62, 23p. incl. illus. table, 9 refs. (Technical rept. no. 279)
Unclassified report

DESCRIPTORS: *Oxygen, *Nuclear cross sections, *Gamma-neutron reactions, *Nuclear resonance, Atomic energy levels, Nucleons, Nuclear shell models, Nuclear structure, Damping.

AD-402 293 Div. 20
(TISTP/WH) OTS price $1.60

Naval Radiological Defense Lab., San Francisco, Calif.
FACTIONATION II. ON DEFINING THE SURFACE DENSITY OF CONTAMINATION,
by E. C. Freiling and S. C. Rainey. 13 Mar 63, 22p. 4 refs. (Rept. no. NRDL-TR-631)
Unclassified report

Division 21 - NUCLEAR PROPULSION
Division 22 - ORDNANCE

DESCRIPTORS: *Radioactive fallout, *Contamination, *Dose rate, *Radioactive decay, Radiation effects, Surfaces, Nuclear explosions.

A technical basis is presented for defining surface density of fallout contamination when the contaminating debris is fractionated. Specifically, it recommends that the exposure dose rate from fractionated debris be expressed as a contamination surface density multiplied by the sum of three terms. The first term is the exposure dose rate contribution of refractorily behaving fission-product nuclides per unit contamination surface density. The second term is a similar quantity for volatilely behaving fission-product nuclides. The third term expresses the contribution of the induced activities. (Author)

AD-402 313 Div. 20, 25, 8
(TISTP/PCR) OTS price $1.50

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
RESEARCH IN ELECTROMAGNETICS, PLASMAS AND NETWORKS.
Final rept., 1 July 58-31 Dec 62, by L. B. Felsen. 13 Feb 63, 54p. incl. illus. refs. (Rept. no. PIBMRI-1112-63)
(Contract AF 19(604)4143, Proj. 5635)
(AFCRL 63-53) Unclassified report

DESCRIPTORS: *Electromagnetic waves, *Diffraction, *Networks, *Plasma physics, Radio communication systems, Radar, Reentry vehicles, Reflectors, Magnetic fields, Waveguides, Electrical impedance, Cerenkov radiation, Propagation, Theory.

The networks program summarized in this report covers many different areas. While some of the results are extensions of already well-established classical theorems, others contain answers to original and previously unsolved problems. In particular, a firm structure for Darlington synthesis has finally been erected. Also, the outstanding problem of optimum multiple-channel filter design has been solved completely for the case of rational spectral densities. This latter result supersedes the work in Wiener's book and in most of the periodicals devoted to smoothing and prediction. Most topics are discussed briefly with emphasis mainly on their pertinent contributions. (Author)

AD-402 453 Div. 20
(TISTW/JEA) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
MEASUREMENT OF GAMMA RADIATION DOSE FROM OPTICAL ACTIVITY VARIATION OF CARBOHYDRATES, by Sh. A. Ablyayev, V. V. Generalov and S. V. Starodubtsev. 29 Mar 63, 8p. incl. illus. 11 refs. (Trans. no. FTD-TT-63-317 from Tashkentskoy Konferentsii Po Mirnomy Ispol'zovaniyu Atomnoy Energii, (Trudy) Vol. 1, pp. 159-163, 1961)
Unclassified report

DESCRIPTORS: *Gamma rays, *Radiation measurement systems, Glucose, Sucrose, Carbohydrates, Optical properties, Polarization, Molecular properties, Rotation, Oxidation-reduction reactions, Ionization, Dosimeters.

21. NUCLEAR PROPULSION

No Entries

22. ORDNANCE

AD-401 121 Div. 22, 12
(TISTP/PCR) OTS price $3.60

Ammunition Group Picatinny Arsenal, Dover, N. J.
DEVELOPMENT OF A MODULAR MECHANICAL PROGRAMMER, by Matthew J. Dujets. Jan 63, 36p. incl. illus. tables. (Technical memo no. DW-433)
Unclassified report

DESCRIPTORS: *Guided missile fuzes, *Rocket fuzes, Specifications, Remote control systems, Photographs, Pictures, Design.

The problem of selecting anoptimumdesign for a warhead fuze system is usually complicated by the fact that system requirements remain undefined until development of the propulsion system is near completion, thus foregoing any extensive development program on the fuze itself. This report presents a modular approach to the fuze design problem by providing a compatible building block programmer made up of individual units which perform specific tasks. Once interchangeable modules capable of performing definite functions have been developed, approximately 80% of the specifications for any missile system can be met by an appropriate choice of the off the shelf modules. Consequently, all of the effort can be concentrated to fulfill the remaining requirements. Also, development and improvement of individual modules can continue without interruption in order to incorporate desirable state-of-the-art advances. (Author)

AD-401 231 Div. 22
(TISTP/PCR) OTS price $1.60

Tactical Air Command, Langley Air Force Base, Va.
OPERATIONAL TEST AND EVALUATION, MB-2A BOMB BANDS.
Mar 63, 15p. incl. illus. (Rept. no. TAC-TR-62-58)
Unclassified report

DESCRIPTORS: *Bomb racks, Bombs, Training ammunition, Tests, Release mechanisms.

This test was conducted to determine the suitability of the MB-2A bomb bands on the B-37K-1 bomb rack. Results of the test showed the MB-2A bomb bands to be compatible with the B-37K-1 bomb rack for all modes of delivery. Ballistic tables obtained from Eglin, though not conclusively tested, appeared to be correct. An increase of washer thickness should be used in future fabrication to prevent the possibility of one end of the bomb band from slipping out of the MA-4A bomb shackle in the B-37K-1 bomb rack. The possibility of increased inadvertent releases when using these bands on the B-37K-1 bomb rack will be more fully evaluated during continued training with these banded MB-2A bombs. (Author)

AD-401 357 Div. 22, 15
(TISTW/JEA) OTS price $1.10

Operations Evaluation Group, Office of Naval Operations, Washington, D. C.
ALLOCATION OF WEAPONS TO TARGETS WITH EXPONENTIAL ARRIVAL TIMES IN A LIMITED TIME INTERVAL, by J. Bram. 16 Jan 63, 9p. (Rept. no. IRM-32)
Unclassified report

DESCRIPTORS: *Kill probabilities, Differential equations, Probability, Time, Time-log theory,

Scheduling, Interception probabilities, Targets, Mathematical analysis, Fire control systems.

Given a supply of N weapons and a time T in which to operate, what is the best way to allocate the weapons among incoming targets arriving with average rate lambda so as to maximize the expected number of targets killed. This problem leads to a system of ordinary differential equations which can be solved recursively, and whose solutions furnish the values of the expected number of targets killed, as well as the optimal firing schedule. (Author)

AD-401 472 Div. 22
(TISTW/PCR) OTS price $2.60

Watertown Arsenal Labs., Mass.
DYNAMIC ANALYSIS OF VIGILANTE TOWED CARRIAGE SUSPENSION SYSTEM,
by Kenneth D. Robertson. Jan 63, 18p. incl. illus. tables (Technical rept. no. WAL TR 850/14)
Unclassified report

DESCRIPTORS: *Gun mounts, *Suspension devices, Tests, Antiaircraft guns, Dynamics, Mathematical analysis, Equations, Mathematical prediction, Acceleration, Photographs, Towed bodies.

The suspension system of the Vigilante X-2 towed gun carriage was analyzed theoretically and tested experimentally. A prediction equation for the maximum acceleration transmitted through the suspension system to the carriage proper is developed and the coefficients and exponents of the prediction equation are evaluated by use of a quarter-scale model. (Author)

AD-401 476 Div. 22
(TISTP/PCR) OTS price $1.10

Bureau of Mines, Pittsburgh, Pa.
SENSITIVITY CHARACTERISTICS OF LIQUID EXPLOSIVE SYSTEMS.
Progress rept. no. 5, 1 Jan-31 Mar 63,
by Charles M. Mason and John Ribovich. Apr 63, 6p. incl. illus. tables, 2 refs.
Unclassified report

DESCRIPTORS: *Liquid gun propellants, Liquid rocket propellants, Explosive materials, Impact shock, Containers, Liquids, Sensitivity.

This report describes the experimental results obtained in a research program to evaluate the safety hazards associated with high-energy liquid explosive systems. Studies were made of shock sensitivity of explosive systems. These included investigations of the effect of type of container and confinement on the results observed in shock sensitivity measurements. (Author)

AD-401 479 Div. 22, 25
(TISTM/PCR) OTS price $1.60

Aerojet-General Corp., Downey, Calif.
PULSE-SENSITIVE ELECTROEXPLOSIVE DEVICES.
Monthly progress rept. no. 8 for Feb 63,
by H. M. Kenworthy. 20 Mar 63, 11p. incl. illus. tables, 1 ref. (Rept. no. 0689-01(08)MP)
(Contract N178-8107)
Unclassified report

DESCRIPTORS: *Explosives initiators, *Metal films, Heat, Electric currents, Thermal conductivity, Beryllium compounds, Oxides, Polyvinyl alcohol, Lead compounds, Azides, Test equipment, Tests, Gold, Firing tests, Photographs, Feasibility studies.

The purpose of this program is to investigate the behavior of a metallic film when it is electrically heated and is in physical contact with a heat sink. Specifically, the aim is to study the variable parameters and to develop a manufacturing process or processes for applying a bridge heating element to a ceramic surface with the required thermal contact. (Author)

AD-401 483 Div. 22
(TISTP/PCR) OTS price $2.60

Air Force Special Weapons Center, Kirtland Air Force Base, N. Mex.
DEVELOPMENT OF THE BDU-17/B PRACTICE BOMB,
by Albert Kokalari. Apr 63, 20p. incl. illus. (Rept. no. AFSWC-TDR-63-54)
Unclassified report

DESCRIPTORS: *Bombs, Bombing, Low-altitude bombing, Offset bombing, Toss bombing, Parachute descents, Ballistics, Configuration, Manufacturing methods, Spotting rounds, Costs, Tests, Salts, Sprays, Vibration, Safety, Drops, Photographs, Training ammunition.

This program was established to develop an inexpensive miniature practice bomb for retarded weapon delivery training. An Air Force preliminary design was modified and produced by a civilian contractor; further modification was accomplished after an Air Force testing program. Preliminary results indicate successful accomplishment of the program objectives. It is expected that the end item should be an inexpensive inventory item which will increase the validity and realism of delivery-crew training. (Author)

AD-401 491 Div 22
(TISTP/PCR) OTS price $2.60

Naval Ordnance Lab., Corona, Calif.
THE RELIABILITY OF SERIES-PARALLEL MULTICHANNEL FUZE SYSTEMS,
by J. G. Rau. Mar 63, 30p. incl. illus. tables, 7 refs. (Technical memo. 52-61)
Unclassified report

DESCRIPTORS: *Fuzes (Ordnance), Reliability, Failure (Mechanics), Probability, Configurations, Equations, Tables, Mathematical analysis.

This report is concerned with multichannel fuze systems in which the channels (component fuzes) are statistically identical, i.e., all have the same probability of early actuation and all have the same probability of dudding (defined as either non-function or late function). Explicit formulas are developed and numerical values are tabulated for the probability of system proper function, early function and dudding, for all possible series and/or parallel fuze configurations of n identical channels, where n = 2, 3, 4, 5. Formulas are also developed for selecting the optimum configuration so as to maximize the average probability of system proper function when the probabilities of system early function and system dudding are assigned various weights. (Author)

AD-401 716 Div. 22, 14, 30
(TISTP/MFA) OTS price $3.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
DEVELOPMENT OF BROAD-BAND ELECTROMAGNETIC ABSORBERS FOR ELECTRO-EXPLOSIVE DEVICES.
Monthly progress rept. no. 8, 1-28 Feb 63,
Paul F. Mohrbach and Robert F. Wood. 28 Feb 63. 27p. incl. illus. tables (Rept. no. P-B1981-8)
(Contract N178-8087)
Unclassified report

DESCRIPTORS: *Ferrites, *Dielectrics, *Explosives initiators, *Attenuators, Synthesis, Attenuation, Tantalum compounds, Barium compounds, Electrolytic capacitors, Coatings, Magnetic properties, Measurement, Resistance (Electrical), Instrumentation, Electrical impedance, Absorption, Design.

In the synthesis of a ferrite material for good attenuation of RF energy at low frequencies, it has been shown that the volume-resistivity plays an important part. It is therefore expedient that a method be devised that measures this parameter with acceptable accuracy. A discussion of several methods is presented with their correlation given in tabular form. One system is for measuring volume resistivity without making contact with the toroid sample. For samples having resistance of ten ohms or less this system functions properly. For values above ten ohms, the effect of flux leakage prevents obtaining a true reading. Tantalum oxide doped with manganese oxide shows promise as a lossy dielectric for out ferrite sample. This material when used in tantalum solid electrolytic capacitors has a loss tangent of 0.665 at 20 Kc. Results of our evaluation of commercial tantalum capacitors confirms this lossiness. Rapid cooling of the fired ferrite is necessary to obtain high conductivity and loss. (Author)

AD-401 759 Div. 22
(TISTP/RD) OTS price $5.60

Hayes International Corp., Birmingham, Ala.
STUDY OF TARGET PENETRATION PREDICTION BY HIGH SPEED AND ULTRA HIGH SPEED BALLISTIC IMPACT.
Final rept., 1 July 61-28 Feb 63.
Apr 63, 57p. incl. illus. tables, 31 refs.
(Contract AF 08(635)2155, Proj. 9860)
(APGC TDR 63-22) Unclassified report

DESCRIPTORS: *Hypervelocity projectiles, Cratering, Mathematical prediction, Satellites (Artificial), Spacecraft debris, Mathematical analysis, Penetration.

On the basis of a statistical study of existing experimental data relative to ballistic impact, engineering formulae were developed which will predict with an accuracy of 90%: (1) the depth of penetration, and (2) the volume of the crater in semi-infinite targets of common metals over a wide range of impact velocities. The application of these equations in predicting the size and velocity of projectiles impacting orbital structures is also indicated. A semi-rational penetration expression was developed from a work-energy consideration which suggests that the nonrecoverable target compression and shear strain energies may account for most of the kinetic energy of the projectile. This dimensional model agrees quite well with the general features of, and is subject to, the same limitations as existing theoretical and empirical models. (Author)

AD-401 836 Div. 22, 3
(TISTP/PCR) OTS price $1.10

Aircraft Armaments, Inc., Cockeysville, Md.
INVESTIGATION OF TELECARTRIDGE DISSEMINATION TECHNIQUES.
Quarterly progress rept. no. 1, 4 Jan-31 Mar 63, by F. C. Latrobe and J. R. Hebert. Apr 62, 7p. incl. illus. table (Rept. no. ER-3043)
(Contract DA 18-108-AMC-80(A))
Unclassified report

DESCRIPTORS: *Cartridges, *Aerosol generators, Propellants, Pressure, Gases, Liquids, Pictures, Scattering.

AD-402 180 Div. 22
(TISTP/FEM) OTS price $2.60

J G Engineering Research Associates, Baltimore, Md.
ELASTIC AND PLASTIC BEHAVIOR OF CYLINDRICAL SHELLS UNDER DYNAMIC LOADS BASED ON ENERGY CRITERIA,
by Joshua E. Greenspon. Feb 63, 18p. incl. illus., 7 refs. (Technical rept. no. 3)
(Contract DA 36-034-ORD-3081)
Unclassified report

DESCRIPTORS: *Structural shells, *Elastic shells, Deformation, Elasticity, Loading (Mechanics), Failure (Mechanics), Axially symmetric flow, Integral equations, Functions, Cylindrical bodies, Plasticity.

A theory for the dynamic elasto-plastic deformations of thin shells is presented. The deformation is obtained by equating the energy input to the energy absorbed by the structure. Large deflections and strain hardening are considered. The theory is applied to the case of a shell undergoing axially symmetric collapse. (Author)

AD-402 246 Div. 22
(TISTP/FEM) OTS price $5.60

California U., La Jolla.
TRANSIENT RESPONSE OF A FLUID/SOLID INTERFACE DUE TO AN IMPULSIVE PRESSURE POINT SOURCE,
by Freeman Gilbert. 1962, 1v. incl. illus.
(Subcontract to E. H. Plesset Associates, Inc., Los Angeles, Contract DA 49-146-xz-073)
Unclassified report

DESCRIPTORS: *Mechanical waves, Surface properties, Integral equations, Velocity, Elasticity, Motion, Shear stresses, Partical beams, Pressure, Density, Polynomials, Air burst.

AD-402 396 Div. 22
(TISTW/JEA) OTS price $1.60

Aerojet-General Corp., Downey, Calif.
PULSE-SENSITIVE ELECTROEXPLOSIVE DEVICES.
Monthly progress rept. no. 9, for Mar 63, by H. M. Kenworthy. 15 Apr 63, 9p. incl. illus. tables, 1 ref. (Rept. no. 0689-01(09)MP)
(Contract N178-8107)
Unclassified report

DESCRIPTORS: *Explosive initiators, *Metal films, Beryllium compounds, Oxides, Capacitors, Electric currents, Ceramic coating, Glass, Photographic equipment, Tests, Radiofrequency pulses, Gold.

The purpose of this program is to investigate the behavior of a metallic film when it is electrically heated and is in physical contact with a heat sink. Specifically, the aim is to study the variable parameters and to develop a manufacturing process or processes for applying a bridge heating element to a ceramic surface with the required thermal contact. (Author)

23. PERSONNEL AND TRAINING

AD-401 072 Div. 23
(TISTA/AW) OTS price $5.60
Joint Publications Research Service, New York.
SCIENTIFIC AND TECHNICAL TRANSLATIONS ON ISRAEL.
4 Jan 63, 52p. (JPRS: 16968)
Unclassified report

Trans. from selected articles from 5 Israeli newspapers.

DESCRIPTORS: *Education, *Engineering, *Universities, Engineering personnel, Industrial research, Nuclear engineering, Electric power production, Nuclear power plants, Soils, Microorganisms.

Contents:
Organization of Tekhnion graduates submits to senate its survey of the curriculum
Letter regarding Tekhnion directory
Growth of Qiryat Hatekhnion
Nuclear engineering center for Tekhnion
Professors from Turkey, guests of the Tekhnion
How a group of students became experts in nuclear physics
The Tekhnion Foundation for Research and Development, Ltd.
Present and future of electric power economy
Report on worthwhileness of building nuclear power stations submitted to Minister of Development
Biological method of land cultivation

AD-401 454 Div. 23
(TISTB/AW) OTS price $2.60

System Development Corp., Santa Monica, Calif.
SYSTEM DESIGN IN THE BASSETT HIGH SCHOOL,
by Robert L. Egbert and John F. Cogswell.
1 Apr 63, 22p. incl. illus. tables, 6 refs.
(Technical memo. no. TM-1147)
Unclassified report

DESCRIPTORS: *Education, Design, Models (Simulations), Language, Learning, Students, Teaching machines, Operations research.

SDC's work with Bassett School District and Brigham Young University in planning a new high school for the Bassett District is reported. Discussions of (a) the project background, (b) the objectives of the work being done by SDC, (c) procedures being used by SDC, and (d) progress made in the SDC effort are presented. In addition to gaining general acquaintance with the nature of the educational program, progress thus far has concentrated on developing detailed operational descriptions, via flow charts, of the Counseling Service and the language arts program, checking the accuracy of the Counseling Service description, and working on development of a new, more comprehensive design of the Counseling Service. Next steps will involve completing design of the Counseling Service, checking the accuracy of the language arts program description, and redesigning the language arts program. Later steps will involve repeating the same 'describe, check, and redesign' routine for other academic areas; putting the entire system together, redesigning as necessary; studying the system through computer simulation; making such changes as seem warranted; and documenting and making operational recommendations for the system. (Author)

AD-401 583 Div. 23
(TISTB/AW) OTS price $8.10

Dunlap and Associates, Inc., Stamford, Conn.
TRACKING TRAINING V: FIELD STUDY OF THE TRAINING EFFECTIVENESS OF THE GENERAL VEHICULAR RESEARCH TOOL,
by Hugh M. Bowen, Allen Hale, and Charles R. Kelley. Dec 62, 81p. incl. illus. tables.
(Contract N61339-955)
(NAVTRADEVCEN 955-1) Unclassified report

DESCRIPTORS: *Training devices, *Training, Tracking, Transfer of training, Simulation, Flight simulators, Submarine simulators, Effectiveness, Vehicles.

A tracking training research apparatus received initial evaluation in two field training situations. A group of primary flight students who received a portion of their training on this apparatus were 11% more proficient than a group without such training in terms of a flight rating measure. A group of submarine personnel given training on the research device were compared with a group given training on a specific simulator. Those trained with the research device did about one-half as well as the other group in controlling the simulator. These results are discussed and recommendations for equipment modifications and further experimental use are presented. (Author)

AD-402 383 Div. 23, 1
(TISTA/GEC) OTS price $1.50

Burroughs Corp., Philadelphia, Pa.
DYNAMIC TASK SCHEDULING IN FLIGHT SIMULATORS.
Final rept. on Simulation Techniques for Aerospace Crew Training,
by Jerome M. Kurtzberg. Feb 63, 45p. incl. illus. tables, 13 refs.
(Contract AF 33(616)8062, Proj. 6114)
(AMRL TDR 63-17) Unclassified report

DESCRIPTORS: *Flight simulators, Scheduling, Dynamics, Pilots, Training devices, Aviation personnel, Design, Programming (Computers), Teaching machines, Operations research.

This report deals with the possible mechanization of dynamic task scheduling in flight simulators, i.e., developing a Task-Sequencer. Attention is focused on the possible application of some of the heuristic programming techniques and an evaluation of their worth for that specific purpose is made. Two main applications for a Task-Sequencer are defined. The first involves the traditional training of students (flight crews) for flight vehicle operation, termed the operation-teaching mode. The second is for the development of tactical skill, i.e., crew decision-making capabilities, termed the tactic-teaching mode. Algorithms for task sequencing in real time are formulated for both of these classes of applications. The only possible benefits in employing a heuristic programming scheme appear to exist when it is used for an ancillary role in the tactic-teaching mode. A procedural training model is developed in detail for the operation-teaching mode. This includes development of specific task flow diagrams and associated scoring charts. Finally, recommendations are made for further work. (Author)

24. PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES

AD-401 391 Div. 24, 18
(TISTM/CCH) OTS price $3.60

RAND Corp., Santa Monica, Calif.
A TRIBUTE TO GEORGE W. GODDARD,
by Amrom H. Katz. Feb 63, 33p. (Rept. no. P-2700)
Unclassified report

DESCRIPTORS: *Photographic equipment, *Aerial reconnaissance, *Military personnel, Aerial photography, Aerial cameras, Photogrametry, Aerial photographs, Air force operations.

25. PHYSICS

AD-401 030 Div. 25
(TISTP/WH) OTS price $1.60

Hebrew U. (Israel).
RESEARCH IN SOFT X-RAY AND FAR ULTRA-VIOLET SPECTROSCOPY.
Annual technical rept., 1 Jan-31 Dec 62,
by E. Alexander and B. S. Fraenkel. 31 Jan 63, 12p.
(Grant AF EOAR 62-33)
(AFOSR 4595) Unclassified report

DESCRIPTORS: *Ultraviolet radiation, *X rays, Spectra (Visible and ultraviolet), Copper, Electric discharges, Instrumentation, Ultraviolet spectroscopy.

Research concerned: building and adjustment of instruments for research in the Vacuum Ultra-Violet, investigation into spectra obtained by the sliding spark method from the electrodes and from the insulator, high spectra of Cu in the 100-200 A region and the dependence of their intensities on electrical parameters, determination of W(74) lines in the 100-200 A region, and investigation into spectra of light elements in the 100-200 A region. A method for obtaining absorption measurements of gases in the far ultra-violet has been developed. (Author)

AD-401 031 Div. 25
(TISTP/FEM) OTS price $14.00

Lincoln Lab., Mass. Inst. of Tech., Lexington.
A MAGNETO-OPTIC APPARATUS FOR THE DYNAMIC STUDY OF FERROMAGNETIC SURFACE DOMAINS.
Doctoral thesis,
by Frederick Williams Sarles, Jr. 23 Dec 60, 200p. incl. illus. tables, refs. (Rept. no. 53 G-0052)
(Contract AF 19(604)7400)
Unclassified report

DESCRIPTORS: *Ferromagnetic materials, *Magneto-optic effect, *Thin films (Storage devices, Kerr cells, Photography, Magnetic properties, Optical phenomena, Switching circuits, Wave transmission, Thyratrons, Surface properties, Films, Photographs.

A magneto-optic apparatus which incorporates a Kerr electro-optical shutter, a high-intensity flash lamp source, and fast-risetime pulsed magnetic fields were constructed. This apparatus was designed for the dynamic study of ferromagnetic surface domains and in particular, for the study of thin permalloy films. Photographs of 10 millimicroseconds exposure duration can be taken at any time point over a 4.5 microsecond range; pulsed magnetic fields up to 13 oersteds are available for switching the specimen. The magneto-optic transmission of the system is analyzed for the two magnetically saturated states of a specimen. Conditions are derived for optimum operation of the system in terms of the transmissions of these states and the ratio of the transmission. Analysis is carried out for the effect of a thin dielectric layer upon the amplitude reflection coefficients. A tentative explanation of color effects observed visually with a dielectric coated specimen is given. The geometrical optical design of the system is discussed with special attention being given to image positioning, image distortion, and aperture limitations. A new brightness theorem is derived; this theorem is particularly useful for determining the illuminance at any point in a lossless optical system. Optical performance estimates of the system, based upon the analysis results, agree within an order of magnitude of actual system performance.

AD-401 037 Div. 25
(TISTP/WH) OTS price $1.60

Laboratories for Applied Sciences, U. of Chicago, Ill.
RESEARCH ON ATMOSPHERIC ATTENUATION OF INFRARED RADIATION.
by Howard T. Betz. 24 June 60, 11p. incl. illus.
(Rept. no. LAS-L-E173-7)
(Contract AF 19(604)5877)
Unclassified report

DESCRIPTORS: *Infrared radiation, *Atmosphere, Instrumentation, Calibration, Attenuation.

AD-401 038 Div. 25, 2
(TISTP/PCR) OTS price $1.60

Laboratories for Applied Sciences, U. of Chicago, Ill.
RESEARCH ON ATMOSPHERIC ATTENUATION OF INFRARED RADIATION.
Technical note,
by Howard T. Betz. May 60, 11p. incl. illus.
(Rept. no. LAS-TN-E173-6)
(Contract AF 19(604)5877)
Unclassified report

DESCRIPTORS: *Infrared radiation, *Atmosphere, Tests, Test methods, Test equipment, Photographs, Attenuation.

This technical note is a brief review of first tests of a thermit standard radiation source both on the ground and on tethered balloons. The purpose of the tests is to measure the atmospheric attenuation of infrared radiation. The experimental method is described in some detail. Photographs of the radiating source are presented.

AD-401 058 Div. 25
(TISTP/FEM) OTS price $4.60

Arkansas U., Fayetteville.
SPECTROSCOPIC STUDIES WITH ION BEAMS.
Technical report,
by R. H. Hughes, J. L. Philpot and others.
Sep 62, 23p. incl. illus. tables, 19 refs.
(Contract AF 19(604)4966, Proj. 7661)
A(AFCRL-63-225) Unclassified report

DESCRIPTORS: *Atomic spectroscopy, *Ion accelerators, Differential equations, Doppler effect, Excitation, Energy, Proton bombardment, Helium, Hydrogen, Nitrogen, Pressure, Optical phenomena, Spectroscopy, Alpha spectra, Beta-ray spectrum, Gamma-ray spectra, Photons, Spectrum analyzers, Line spectrum, Particle beams.

A spectroscopic study of ion-atom and ion-molecule collision processes is presented. Absolute cross sections for excitation of principal visible features are presented in this report for proton impact on He, H sub 2, and N sub 2 in the proton-energy range from about 10 kev to 130 kev. Optical radiation is observed at an angle to the beam, which allows measurement of charge-changing cross sections for electron capture into certain

excited states of hydrogen. Reprints of published studies of 200-kev proton impact on He and N sub 2 are included together with a reprint of a note describing some spectral features of 200 kev H sub 3(+), 130 -200 kev H sub 2(+) impact on H sub 2 and He. Calculated minimum-energy defects for several reactions are also included. (Author)

AD-401 086 Div. 25
(TISTP/GRW) OTS price $2.60

Texas Instruments Inc., Dallas.
SOLID-STATE TECHNIQUES FOR MODULATION AND DEMODULATION OF OPTICAL WAVES.
Quarterly progress rept. no. 2, 1 Aug-31 Oct 62, by Dayton D. Eden. 17 Jan 63, 29p. incl. illus. (Rept. no. U2-74000-2)
(Contract DA 36-039-sc-89221, Proj. no. 3A-99-21-001)
Unclassified report

DESCRIPTORS: *Optics, *Solid state physics, Lasers, Modulation, Photoelectric materials, Optical analysis, Kerr cells, Diodes, Wave transmission.

A number of wide-band modulators (dc to 500 mc and higher) were constructed using KDP. Y-cut quartz is being designed into a TEM travelling wave structure. Pure cuprous chloride crystals are being grown for specific application in wideband TEM phase modulators. An optical FM-to-AM converter using rutile is being prepared. Good audio reception was obtained at 1000 ft using gallium arsenide light-emitting diodes and silicon detectors in hand-held units. A number of pill package photovoltaic detectors were fabricated; typical junction capacitances are on the order of 1 pf and typical base resistances are about equal to 2 or 3 ohms. A smaller junction diameter of 4 mils appears possible by using new masking and etching techniques. Modulated light from a gallium arsenide diode was detected (using an air path) by a germanium photodiode at about 100 mc. Modulated light from a gallium arsenide diode at 900 mc was detected by a silicon photovoltaic detector, using, for a light path, a tapered glass rod bonded to both source and receiver. (Author)

AD-401 092 Div. 25
(TISTM/CCH) OTS price $1.60

Politecnico di Milano (Italy).
RESEARCHES ON HYDROGEN OVERVOLTAGE ON METALLIC SINGLE CRYSTALS: CADMIUM.
Report for June 59-July 60 on Surface and Interface Phenomena of Matter,
by L. Peraldo Bicelli, A. La Vecchia, and N. Sala Cataffo. Feb 61, 14p. incl. illus. tables, 11 refs.
(Contract AF 61(052)144, Proj. 7022)
(WADD TN 60-269) Unclassified report

DESCRIPTORS: *Single crystals, *Hydrogen, Electrodes, Cadmium, Electric potential.

Hydrogen overvoltage on cadmium polycrystalline and single crystal cathodes, oriented following the (0001), (1010) and (1120) planes, has been measured in perchloric acid solutions. The Tafel law holds nearly; the parameters being different for the different electrodes. (Author)

AD-401 107 Div. 25, 4, 20
(TISTM/ODN) OTS price $2.60

RIAS Inc., Baltimore, Md.
THEORETICAL AND QUANTUM CHEMISTRY OF BORON COMPOUNDS AND RELATED MOLECULES.
Final rept.,
by Joyce J. Kaufman. 15 Mar 63, 21p.
(Contract Nonr 347100)
Unclassified report

DESCRIPTORS: *Boron compounds, Atomic orbitals, Pentaboranes, Ionization potentials, Chemical bonds, Aluminum compounds, Theory, Quantum mechanics, Fluorides, Xenon, Decaboranes, Valence, Mass spectrum, Electrons, Molecular properties.

Research in the development of methods to describe the valence structure, properties and behavior of boron compounds and related molecules was conducted. Investigations in the following areas are discussed: (1) the theoretical study of charge transfer behavior of boron-containing Lewis acid-Lewis base addition compounds, especially those of the type ZB10H12Z; (2) rigorous molecular orbital calculations of boron compounds; (3) ionization potentials and mass spectral fragmentation patterns of boron compounds, also the effects of substitution on ionization potentials for cyclic radicals and for O and S compounds; (4) theoretical study of aluminum coordination numbers in various compounds; and (5) theoretical aspects of bonding in xenon-fluorine compounds.

AD-401 133 Div. 25
(TISTP/GRW) OTS price $2.60

Armour Research Foundation, Chicago, Ill.
INVESTIGATION OF NARROW LINE PARAMAGNETIC RESONANCE ABSORPTION SPECTRUM IN SINGLE CRYSTAL CALCITE.
Final rept., 5 Apr-5 Nov 62,
by Samson A. Marshall. 5 Nov 62, 25p. incl. illus. tables, 23 refs. (Rept. no. ARF-A1216-7)
(Contract AF 30(602)2755)
Unclassified report

DESCRIPTORS: *Single crystals, *Line spectrum, *Calcite, Paramagnetic resonance, Absorption spectrum, Hyperfine structure, Crystal lattice defects.

Results of an investigation of a narrow five-line spectrum in irradiated Calcite single crystals are presented. The objective was to discover, by a systematic investigation of the properties of the electron paramagnetic resonance absorption spectrum of these five narrow lines, the defect center or centers responsible for the spectrum. A secondary objective was to make recommendations regarding the usefulness of this spectrum for a quantum-electronic device. Results indicated that this five line spectrum is generated by more than one defect center. The conclusion was reached by comparing the irradiated and unirradiated spectra. The spectrum of what is tentatively called a 'butterscotch' defect center was also discovered. This defect center appears to be a CO2 negative ion located at a carbonate ion site in calcite. (Author)

AD-401 179 Div. 25
(TISTM/CCH) OTS price $1.10

Rensselaer Polytechnic Inst., Troy, N. Y.
ANALYSIS OF THE DYNAMICS OF ELASTIC SYSTEMS.
Final rept., 1 Nov 60-31 Oct 62.
31 Oct 62, 4p. 6 refs.
(Contract AF 49(638)962)
(AFOSR 4555) Unclassified report

DESCRIPTORS: *Elastic shells, *Mechanical waves, Analysis, Vibration, Motion.

The application of asymptotic methods to problems of elastic vibration and wave motion and the analysis of stochastic effects in the behavior of elastic structures was investigated. Two problems in elastic vibrations have been solved. One is concerned with the vibrations of a pendulum in which the elastic properties of the support rod are taken into account. The method of solution was based on an asymptotic expansion in terms of the small stiffness of the rod. Similarly, the transverse vibrations of a circular plate under tension were studied. The elastic stability of bars in which the cross-sectional dimensions are not small when compared with the length was analyzed. In the area of random effects, an analysis of the bending of columns by axial loads of random eccentricity was completed. The transverse vibrations of a taut string with randomly varying mass distribution were investigated. A somewhat similar problem concerning the longitudinal vibrations of an elastic bar whose cross-sectional area varies in a random manner was solved. (Author)

AD-401 188 Div. 25, 15
(TISTP/MFA) OTS price $1.60

Mathematics Research Center, U. of Wisconsin, Madison.
TRANSIENT MAGNETOHYDRODYNAMIC FLOW IN AN ANNULAR CHANNEL,
by M. N. L. Narasimhan. Feb 63, 19p. incl illus. tables, 8 refs. (MRC technical summary rept. no. 381)
(Contract DA11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Magnetohydrodynamics, *Fluid flow, Integral equations, Electrical conductance, Transients, Bessel functions, Magnetic fields, Viscosity, Pressure.

Unsteady parallel flow of an electrically conducting, viscous incompressible fluid in an annular channel in the presence of a radial transverse magnetic field is considered. Assuming the fluid to be at rest at the initial moment, the velocity distribution and magnetic field components are obtained in terms of Bessel and Lommel functions and in the form of convolution integrals taking the longitudinal pressure as an arbitrary function of time. Further, taking a step function for the pressure gradient, these expressions are integrated. The influence of the magnetic field on the annular flow is investigated. Some numerical examples are given. (Author)

AD-401 191 Div. 25
(TISTP/WH) OTS price $3.60

Advanced Kinetics, Santa Ana Calif.
PRODUCTION OF MILLIMETER AND SUB-MILLIMETER ELECTROMAGNETIC WAVES BY THE INTERACTION OF PLASMA AND ELECTRON BEAMS WITH HIGH INTENSITY PULSED MAGNETS.
Quarterly scientific rept. no. 8 (Final),
by Ralph W. Waniek. 15 July 62, 27p. incl. illus. 11 refs.
(Contract AF 19(604)7406)
(AFCRL-62-718) Unclassified report

DESCRIPTORS: *Millimeter waves, *Plasma physics, *Electron beams, *Electromagnetic waves, Magnetic fields, Bremsstrahlung.

The attempt to produce the production of coherent millimeter and sub-millimeter electromagnetic radiation at high power levels by the decelerarion of charged particles injected into strong magnetic fields is discussed. Difficulties related to the source-detection problem in this region of the spectrum are treated. (Author)

AD-401 216 Div. 25, 15
(TISTP/MB) OTS price $2.60

Mathematics Research Center, U. of Wisconsin, Madison.
PULSATING MAGNETOHYDRODYNAMIC FLOW SUPERPOSED ON THE STEADY LAMINAR MOTION OF AN INCOMPRESSIBLE VISCOUS FLUID IN AN ANNULAR CHANNEL,
by M. N. I. Narasimhan. Feb 63, 21p. incl. illus. 8 refs. (MRC Technical summary rept. no. 379)
(Contract DA -11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Magnetohydrodynamics, Fluid flow, Electromagnetic wave, Velocity, Magnetic fields, Theory.

Consideration is given to pulsating laminar flow superposed on the steady motion of a viscous incompressible electrically conducting fluid in an annular channel between two infinitely long circular cylinders under a radially impressed magnetic field. The general magnetohydrodynamic equations are simplified by the conditions of the problem to three equations in pressure, velocity and magnetic field. One equation gives the pressure variation in the radial direction; the other two are coupled equations for the velocity and magnetic field, which are functions of the radial variable only. The solutions of these equations have been obtained in terms of Kelvin and Lommel functions and the velocity profiles are examined for different values of the frequencies of pulsation. (Author)

AD-401 255 Div. 25, 4
(TISTM/TCG) OTS price $1.10

Clark U., Worcester, Mass.
INFRARED SPECTRA OF METAL CHELATE COMPOUNDS.
Final rept., Jan 60-Aug 61,
by Kazuo Nakamoto and Arthur E. Martell. Feb 62, 7p.
(Contract DA 19-020-ORD-5119 and Grant DA-ORD-31-124-61-G61)
(AROD 2563-10)
Unclassified report

DESCRIPTORS: *Infrared spectroscopy, *Metal-organic compounds, *Organic compounds, Molecular association, Molecular structure, Chemical bonds, Resonance absorption, Perturbation theory, Complex compounds, Spectra, (Infrared), Organic compounds, Other.

Investigation of the IR spectra of metal chelate compounds was based on theoretical normal coordinate analyses and complete band assignments, especially in the lower frequency region, where the metal-ligand vibrations occur. Perturbation calculations and normal coordinate analyses were made of Co, Cr, Fe, Al, Pd, Cu, Ni, Zn, and Be acetylacetonato and oxalato complexes. (Author)

AD-401 294 Div. 25
(TISTP/WH) OTS price $6.60

Armour Research Foundation, Chicago, Ill.
NANOSECOND PULSE BREAKDOWN STUDY.

Final rept., 15 May-15 Nov 62,
by Lawrence C. Scholz. Dec 62, 58p. incl. illus. 123 refs. (Rept. no. ARF-A217-7)
(Contract AF 30(602)2780)
(RADC TDR 62-616) Unclassified report

DESCRIPTORS: *Electric discharges, *Electromagnetic pulses, *Plasma physics, Gas ionization, Gas discharges, Microwaves.

A summary of microwave gas breakdown theory is presented with special emphasis on nanosecond pulse breakdown. The various approaches previously presented in the literature are compared and shown to be identical as far as practical results. It is suggested that in general, for pressure-time products greater than 1 torr-nanosecond, measurements made under cw conditions will be satisfactory. (Author)

AD-401 320 Div. 25
(TISTP/JW) OTS price $1.60

Aerospace Information Div., Washington, D. C.
MAGNETO-OPTICS OF RARE-EARTH IONS IN FERROMAGNETIC CRYSTALS,
by G. S. Krinchik. 3 Apr 63, 11p. incl. illus.
(AID rept. T-63-46; Trans. from Fizika tverdogo tela, 5:2, pp. 373-380, 1963)
Unclassified report

DESCRIPTORS: *Ferromagnetic crystals, Rare earths, Ionization, Garnet, Lasers, Ions, Magneto-optic effect.

An experimental and theoretical investigation of ferrite garnet crystals doped with rare-earth ions and subject to an external magnetic field is presented. According to the author, the energy level structure of such a system, based on the exchange interaction effect, leads itself to the design of an inherently controllable infrared laser. (Author)

AD-401 342 Div. 25, 20
(TISTP/JW) OTS price $2.60

Naval Radiological Defense Lab., San Francisco, Calif.
HYDRA PROGRAM DETERMINATION OF THE TOTAL THERMAL RADIANT ENERGY EMITTED BY AN UNDERWATER EXPLODING WIRE,
by J. S. Hege. 10 Jan63, 30p. incl. illus. tables, 5 refs. (Rept. no. NRDL-TR-612)
(DASA 1344)
Unclassified report

DESCRIPTORS: *Thermal radiation, *Underwater explosions, Measurement, Temperature, Spark ignition, Electrodes, Photoelectric effect, Underwater, Simulation.

The total thermal radiation from an underwater spark was determined by the measurement of the absolute radiation at two wavelengths as a function of time. Planck's law for thermal radiation was applied. The spark was generated by electrically exploding a 5-mil. copper wire stretched between two submerged electrodes. The spark was assumed to be cylindrical with its length determined by the length of the wire. The light measurements were made with two calibrated photoelectric tubes. Wavelengths of 407 and 610 millimicrons were selected with Farrand interference filters. Values for the rates of total radiation and values for the spark temperatures and radii were tabulated and graphed as functions of time for three explosions under three different sets of conditions. Total thermal radiation was obtained by graphically integrating the rate of thermal radiation over the time of the process. For two of the three explosions approximately 30% of the spark energy was emitted as thermal radiation. It was not possible to determine this fraction for the third explosion. Analysis of the propagation of error shows that the error in the results for total thermal radiation is less than 7.5 times any error in the measurements of the radiation incident on the photoelectric tubes. (Author)

AD-401 355 Div. 25
(TISTP/JW) OTS price $1.10

Space Technology Labs., Inc., Redondo Beach, Calif.
HIGH FREQUENCY LASER RESEARCH PROGRAM.
Monthly progress rept. no. 3 for Dec 62,
by R. S. Witte and R. M. Herman. Dec 62, 4p.
(Rept. no. 8695-6003-SU-000)
(Contract AF 04(695)196)
Unclassified report

DESCRIPTORS: *Lasers, Glow discharges, Gases, Argon, Ultraviolet radiation, High frequency.

AD-401 372 Div. 25
(TISTP/WH) OTS price $1.60

National Electrotechnical Inst. (Italy).
NUMERICAL ANALYSIS OF BARRIER - INJECTION ELECTRO LUMINESCENCE. PART I.
Final rept.,
by G. Bonfigliolig, P. Brovetto, and A. Suardo.
Nov 62, 12p. incl. illus.
(Contract AF 61(052)328)
(AFOSR 4581-22300) Unclassified report

DESCRIPTORS: *Electroluminescence, *Zinc compounds, *Electrons, Intermetallic compounds, Sulfides, Electric current, Phosphorus, Powders, Numerical analysis, Injection.

Numerical analysis concerning Barrier-Injection Electroluminescence is discussed. The current density through an (admittedly cubic shaped) grain of the phosphor powder, when a linear transient of electrical potential is applied to the whole cell is evaluated. Also the shape of the ensuing light pulse is found. (Author)

AD-401 374 Div. 25, 15
(TISTP/GRW) OTS price $3.60

Naples U. (Italy)
RENORMALIZATION GROUP AND COMPLETENESS OF FIELD THEORIES. NUCLEON-PION COUPLINGS.
by E. R. Caianiello and M. Marinaro. Aug 62, 28p. 8 refs.
(Contracts DA 91-591-EUC-162 and AF 61(052)434)
(AFOSR 4579) Unclassified report

DESCRIPTORS: *Quantum mechanisms, *Field theory, Nucleons, Pions, Green's function, Quantum statistics, Integral equations.

The problem of the mathematical consistency of a field theory defined by a given local Hamiltonian is studied in terms of the propagator (Green's function) formalism. (Author)

Division 25 - PHYSICS

AD-401 376 Div. 25
(TISTM/ODN) OTS price $1.10

Israel Inst. of Tech., Haifa.
INDUCED MAGNETIC ANISOTROPY IN THIN FILMS INVESTIGATED AT VERY LOW TEMPERATURES.
by A. A. Hirsch and N. Friedman. 1962, 8p. incl. illus. 6 refs.
(Contract AF 61(052)481)
(AFOSR 4591) Unclassified report

DESCRIPTORS: *Metal films, Cryogenics, Magnetic fields, Magnetostriction, Films, Ferromagnetic materials, Hysteresis, Iron, Nickel, Anisotropy.

A new method of investigation of induced magnetic anisotropy in thin films is given, based on the study of the magnetoresistance effect when two crossed magnetic fields are applied. The experiments were carried out from liquid air down to liquid helium temperatures on thin evaporated films of pure nickel or pure iron placed in a rotated cryostat. It was shown that when the films are deposited in an external magnetic field in a vacuum of 10 to the -6th power mm of Hg, the easy axis of magnetization is induced in the direction of the external field. The experimental data were compared with a theoretical model suggested for the magnetization of films under the influence of two crossed magnetic fields. This model was elaborated by means of the approximation of coherent rotation of electron spins in a single domain particle, whose anisotropy was made up of a unidirectional, a uniaxial and a cubic magnetocrystalline component. It was found that films deposited in an external magnetic field show a symmetry around the easy magnetization axis like a spheroidal particle around the polar axis. At very low temperatures the induced magnetic anisotropy is more distinct because of vanishing thermal stresses. (Author)

AD-401 380 Div. 25
(TISTP/TL) OTS price $1.60

Frick Chemical Lab., Princeton U., N. J.
INFRARED SPECTRA OF HF-DF MIXED CRYSTALS AND THE STRUCTURE OF HYDROGEN FLUORIDE.
by M. L. N. Sastri and D. F. Hornig. Feb 63, 16p. illus. (Technical rept. no. 14)
(Contract Nonr-185827, Proj. NR-014-203)
Unclassified report

DESCRIPTORS: *Infrared spectroscopy, *Hydrogen compounds, *Fluorides, *Deuterated compounds, *Crystals, Heavy water, X-ray diffraction analysis, Crystal lattices, High frequency, Low frequency, Raman spectroscopy, Line spectrum.

The infrared spectra of HF-DF mixed crystals have been studied throughout the composition range. Unlike HF, the spectrum of pure DF shows only the two peaks in the stretching region which are characteristic of the zig-zag chain structure found by X-ray studies for HF and spectroscopically for HCl and HBr. The spectrum of pure HF shows the anomalous features previously reported. From the mixed crystal spectra it is clear that there is only one kind of site and one kind of strongly interacting pair in either HF or DF. A resolved peak due to triplets of HF (in DF) and of DF (in HF) has been observed. It is concluded that the extra peaks in pure HF probably arise from lattice combinations; in any case all of the major features of the spectra are accounted for by the zig-zag chain structure. It has not yet been possible to interpret the lattice spectrum in detail. (Author)

AD-401 414 Div. 25, 4
(TISTW/JEA) OTS price $9.10

Space Technology Labs., Inc., Redondo Beach, Calif.
LIQUID LASER RESEARCH.
Final rept., 7 Mar 62-7 Mar 63,
by M. W. Windsor, J. R. Novak and others.
20 Mar 63, 95p. incl. illus. tables, 33 refs.
(Rept. no. 8657-6007-RU000)
(Contract AF 04(695)97)
Unclassified report

DESCRIPTORS: *Lasers, *Organic compounds, Spectrum analyzers, Cavity resonators, Intensity, Terbium compounds, Rare earth compounds, Excitation, Low temperature research, Life expectancy, Glass, Emissivity, Plastics, Europium compounds, Samarium compounds, Metalorganic compounds, Liquefied gases, Organic compounds, other.

The fundamentals of laser theory are reviewed and criteria are developed for laser action in the liquid state. What is needed are compounds which exhibit high-efficiency, narrow-line fluorescence of millisecond duration. Fluorescence of such long lifetime is usually completely quenched in solution by collisional deactivation of the excited molecule. Exceptions occur where the emitting level is well-shielded from the environment as in large organic molecules. The properties of several classes of such molecule are reviewed and thresholds for laser action are calculated. Rare-earth chelates appear to have the lowest thresholds and have been chosen for experimental studies. (Author)

AD-401 478 Div. 25
(TISTP/MFA) OTS price $3.60

RAND Corp., Santa Monica, Calif.
THE INTERACTION OF LASER LIGHT WITH METALS (ELECTRON-OPTICAL PHONON INTERACTION IN METALS),
by H. T. Yura. Mar 63, 30p. incl. illus. 7 refs.
(Memo. no. RM-3560-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Lasers, *Metals, Transition elements, Stainless steel, Copper, Relaxation time, Photons, Phonons, Melting, Vaporization, Crystal lattices.

The interaction of laser light with a metal is considered. A model is proposed in which the dominant mechanism for electron de-excitation in transition metals is by the emission of optical phonons, as contrasted to the simple metals where the dominant mechanism is by the emission of acoustic phonons. Calculations based on this model give, for steel, an electron-optical phonon relaxation time difference of 10 to the -7th power to 10 to the -6th power sec compared with an electron-acoustic phonon relaxation time difference of 10 to the -11th power to 10 to the -10th power sec for a simple metal such as copper. (Author)

AD-401 498 Div. 25
(TISTP/FEM) OTS price $4.60

American Cyanamid Co., Stamford, Conn.
BIBLIOGRAPHY OF VACUUM ULTRAVIOLET SPECTROSCOPY
Rept. on Non-Metallic and Composite Materials, July 60-Oct 62,
by Robert C. Hirt and Richard G. Schmitt. Feb 63, 44p.
(Contract AF 33(616)7958, Proj. 7340)
(ASD TDR 62-915) Unclassified report

DESCRIPTORS: *Bibliographies, *Ultraviolet spectroscopy, Vacuum apparatus, Electromagnetic waves.

This bibliography of publications in the field of vacuum ultraviolet spectroscopy is arranged alphabetically by senior author, with a four-letter code (called CODEN) for the journal reference. The format and presentation are suited for easy punching onto IBM punched cards for machine sorting. A subject index is provided to the more than 1300 references. (Author)

AD-401 594 Div. 25
(TISTP/WH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CONTRIBUTION TO THE PROBLEM OF THE EFFECT OF THE ATMOSPHERE ON THE RADIATION OF AN ARC DISCHARGE (2ND INSTALLMENT),
by C. P. Semenova and M. V. Petrova. 11 Mar 63, 15p. incl. illus. tables, 12 refs. (Trans. no. FTD-TT-63-19 from Russian Periodical, Izvestiya Vysshikh Uchebnykh Zavedeniy, Fizika, No. 1, pp. 111-117, 1962)
Unclassified report

DESCRIPTORS: *Electric arcs, *Electrodes, Copper, Iron, Air, Argon, Nitrogen, Spectra (Visible and ultraviolet).

AD-401 655 Div. 25
(TISTP/FR) OTS price $2.25

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
THEORETICAL INVESTIGATION OF A MAGNETO-OPTICAL GYROSCOPE.
Final rept., Nov 60-Apr 62.
Feb 63, 78p. incl. illus. 25 refs. (Rept. no. ESL-R-125, vol. 2)
(Contract AF 33(616)7668, Proj. no. 4431)
(ASD-TDR 62-492, vol. 2)
Unclassified report

DESCRIPTORS: *Gyroscopes, Nuclear magnetic resonance, Colloids, Molecules, Fluids.

A theoretical investigation of the feasibility of using magneto-optical and certain other physical phenomena for gyroscopic measurement purposes is summarized. The phenomena investigated in this report are nuclear angular momentum effects, Coriolis force effects on various particles and bulk fluid effects. The conclusions reached are as follows. The magneto-optical gyroscope, based on the Barnett and Faraday effects, is potentially capable of a resolution on the order of 0.1 radian/sec providing stray magnetic field effects are shielded to maintain field fluctuations down to the order of 10 to the 9th gauss. Methods based on nuclear angular momentum may be able to achieve one to three orders of magnitude more resolution with less sensitivity to stray fields than the magneto-optical approach. Maser techniques would be needed to reach the lower limit on resolution. Coriolis force effects in specially constructed dielectrics appear to be too small in comparison with other forces to be useful. This conclusion applies to both microscopic and colloidal particle sizes. The investigation closed with a study of bulk fluid effects. It is shown that an ordinary liquid like mercury is sufficiently decoupled from its container so that it may be useful as a stable platform reference. However, the problem of measuring the displacement of the inner fluid mass with respect to its container has not been solved. (Author)

AD-401 659 Div. 25, 8
(TISTE/CAM) OTS price $5.60

Marquardt Corp., Van Nuys, Calif.
INVESTIGATION OF THE CURRENT DENSITY LIMITATIONS IN A THERMIONIC CONVERTER.
Annual summary rept., 1 Mar 62-28 Feb 63,
by Coleman Kaplan. Mar 63, 44p. incl. illus. 24 refs. (Rept. no. 25081)
(Contract Nonr 373800; Proj. NR 099-366)
Unclassified report

DESCRIPTORS: *Thermionic converters, *Triodes, *Diodes (Electron tubes), Electron beams, Electric potential, Temperature, Electric discharge, Pressure, Field emission, Ions, Space charges, Plasma physics, Work functions, Oscillation, Thermionic emission, Test equipment, Test methods, Electric currents, Cesium.

Oscillations in grid voltage, output voltage and output current were observed over a wide range of operating conditions with a cesium-vapor triode. At higher cesium pressures, the oscillation period is an increasing function of the cesium pressure, which implies that the oscillations are controlled by scattering of positive ions in the interelectrode region. An approximate calculation of the ion accelerating voltage required to transfer ions from the middle of the emitter-collector space to the collector indicates a voltage of between 0.5 and 1.0 volt. Pulsed-discharge experiments were to investigate current-density limiting factors in a cesium diode operating in the intermediate temperature range. The experimental technique consisted of applying a pulsed discharge to the test cell and observing the effect upon output current after the pulse. When the diode operation was space-charge limited, a large increase in current was observed after the pulse. Reasonable agreement was obtained between the current density measured after a pulsed discharge and the saturated electron current density obtained from the literature. Measurements of the time required to establish equilibrium after the pulsed discharged provided information on the physics of cesium diode thermionic converters. Calculations were performed. (Author)

AD-401 664 Div. 25
(TISTP/JW) OTS price $3.60

Frick Chemical Lab., Princeton U., N. J.
THE STRUCTURE OF SHOCK FRONTS IN ARGON AND NITROGEN,
by M. Linzer and D. F. Hornig. 1 Apr 63, 23p. incl. illus. tables, 19 refs. (Technical rept. no. 6)
(Contract Nonr-185824, Proj. NR-061-041)
Unclassified report

DESCRIPTORS: *Shock waves, Nitrogen, Argon, Gases, Optical properties, Reflection, Analysis.

The optical reflectivity method was used to investigate the structure of shock fronts in argon from Mach 1.70 to Mach 4.85 and in nitrogen from Mach 2.01 to Mach 3.72. Experimental data were obtained at two wavelengths and over a wide range of initial pressures. The reflectivities, corrected empirically for shock curvature, were fitted to a bimodal profile to yield a maximum-slope density thickness. There is excellent agreement, especially at the higher shock strengths, with recent bimodal calculations carried out by Muckenfuss, using realistic intermolecular potentials. In nitrogen, the shocks are thinner than in argon and appear to attain a minimum value of 2.5 initial mean free paths at about Mach 3.7. Rotational relaxation

appears to be as rapid in the strong shocks as previously observed in weak shocks; it appears to be completed within the shock front. The experimental density thicknesses are approximately 50% greater than those calculated from the Navier-Stokes equations, using experimental shear viscosity micron and a bulk viscosity of 2 microns/3. The agreement with these Navier-Stokes solutions is about as good as those in argon. (Author)

AD-401 669 Div. 25
(TISTP/WH) OTS price $2.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
A STUDY OF THE VIBRATIONS OF SHALLOW SPHERICAL SHELLS,
by W. H. Hoppmann, II and Clifford N. Baronet. Jan 63, 37p. incl. illus. tables, 9 refs.
(Rept. no. 1188)
Unclassified report

DESCRIPTORS: *Structural shells, *Vibration, *Stresses, Digital computers, Spheres, Mathematical analysis.

A comparison is presented of the theoretically and experimentally determined frequencies and zero displacement lines for the normal mode vibrations of shallow spherical shells. Results are given for the clamped edge and the momentless edge boundary conditions. Calculations of frequencies and loci of zero displacement components for various shell sizes were made on an IBM 650 computer for the rotationally symmetric vibrations only, as the theory is not available for the case of asymmetric vibrations. Experiments were performed to determine the vibration characteristics both for the symmetric and the asymmetric vibrations. Several model shells constructed of steel were used for the purpose. Results of the investigation definitely demonstrate the value of the theory for the determination of the dynamic response of shallow shells. (Author)

AD-401 679 Div. 25, 9
(TISTP/WH) OTS price $5.60

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
AXIAL FIELD EFFECTS IN A MAGNETICALLY DRIVEN SHOCK TUBE.
Doctoral thesis,
by William H. Heiser. 29 Mar 63, 51p. incl. illus. 15 refs. (Technical rept. no. 408)
(Contract DA 36-039-sc-78108, Grant nos. DA-SIG-36-039-61-G14 and Grant G-24073)
Unclassified report

DESCRIPTORS: *Shock waves, *Magnetic fields, *Shock tubes, Gas flow, Magnetohydrodynamics.

The effects of a uniform magnetic field normal to the shock front upon shock states and expansion wave properties are theoretically and experimentally investigated for large magnetic-drive fields. One-dimensional theory and several simplifying assumptions are employed to predict the important effects, and a simple method of visualizing the possible shock states is obtained. Observations of well-formed shocks indicate close agreement with shock-transition theory, even when the axial magnetic field exceeds the switch-on value, although the expansion wave properties exhibit large departures from the theory. Some estimates of flow adjustments caused by radius effects and leakage through the boundary layer have been made, and are found to contribute to an understanding of the experimental results. (Author)

AD-401 688 Div. 25
(TISTP/JW) OTS price $3.60

Harry Diamond Labs., Washington, D. C.
RESONANT FREQUENCIES OF CYLINDERS OF ANY DIMENSIONS,
by George K. Lucey, Jr. 30 Jan 63, 37p. incl. illus. tables, 11 refs. (Rept. no. TR-1108)
(Proj. DA-5N06-01-014)
Unclassified report

DESCRIPTORS: *Resonance, Piezoelectric effect, Transformers, Cylindrical bodies, Frequency, Equations, Vibration.

Resonant frequency equations for right circular cylinders of any dimensions were derived to aid in the design of microminiature ceramic piezoelectric filters and transformers. The classical Rayleigh method was modified to include a phantom work term that accounted for energies lost to vibrations in the coupled mode. Equations were developed for the radial mode and the longitudinal mode. The equations derived were verified experimentally over a full range of dimension ratios for BaTiO3 cylinders and for a small group of steel cylinders. (Author)

AD-401 695 Div. 25
(TISTP/WH) OTS price $1.60

Harry Diamond Labs., Washington, D. C.
ENERGY LOSS OF A RELATIVISTIC ELECTRON IN A LORENTZIAN MODEL PLASMA,
by Clyde A. Morrison. 25 Mar 63, 17p. 4 refs.
(Rept. no. TR-1109)
(Proj. DA-597-01-006)
Unclassified report

DESCRIPTORS: *Electrons, *Plasma physics, *Quantum mechanics, Energy, Relativity theory, Plasma oscillations.

The energy loss of a relativistic electron in a Lorentz type plasma is calculated by the method of Landau. No relativistic correction was found for a collisionless plasma; however, corrections occur for a plasma with collision losses. (Author)

AD-401 702 Div. 25, 15
(TISTP/WH) OTS price $2.60

Tracor Inc., Austin, Tex.
AN ANALYTIC SOLUTION TO THE SOUND PRESSURE FIELD RESULTING FROM A PLANE WAVE INCIDENT ON A CYLINDER AND CONCENTRIC CYLINDRICAL SECTION.
Technical memo.,
by J. D. Morell, W. C. Moyer, and A. F. Wittenborn. 14 Mar 63, 21p. incl. illus. 7 refs.
(Rept. no. TRACOR 63-112-U)
(Contract NObsr-85185)
Unclassified report

DESCRIPTORS: *Sound, *Cylindrical bodies, *Wave transmission, Sonar equipment, Integral equations, Partial differential equations, Bessel functions, Fourier analysis, Series, Reflection, Analysis.

This memorandum describes a method for computing the solution to the boundary value problem consisting of a plane sound wave incident on an infinite-length, right circular cylinder and a section of a right circular cylindrical shell concentric with the cylinder. The problem is formulated so that the section of the cylindrical shell shields the circular cylinder from the incident plane wave. The frequency of the incident wave, the surface impedance of the cylinder and shell, the relative spacing of the cylinder and

shell and the angular extent of the shell are parameters of the solution. This boundary value problem was considered because it represents a tractable formulation for investigating the sound field in the vicinity of a sonar transducer, produced by a source, such as the ship's screws, after this sound field has been modified by a baffle interposed between the source and the transducer. The cylindrical shell represents the baffle. (Author)

AD-401 715 Div. 25, 8
(TISTP/WH) OTS price $4.60

Electron Physics Lab., U. of Michigan, Ann Arbor
NOISE PROPAGATION IN A NONUNIFORM ELECTRON GAS,
by Gunnar Hok. Mar 63, 41p. incl. illus. 5 refs.
(Technical rept. no. 58; 05000 3-T)
(Contract AF 33(657)8050, Proj. 4856)
Unclassified report

DESCRIPTORS: *Plasma oscillations, *Noise (Radio), *Electron beams, *Mechanical waves, Statistical mechanics, Electron density, Transport properties, Partial differential equations, Integral equations, Propagation, Electrons.

As a first step in the development of a more general theory of propagation and transport of noise by compressional waves in a nonuniform electron gas, the medium-like propagation in an electron gas in equilibrium with one or two plane emitters is treated. In analogy with acoustic propagation in a neutral gas, adiabatic compressions are tentatively postulated; the solutions are then accepted as physically significant only if they satisfy the conditions for negligible Landau damping. It is found that the plasma resonance frequency or low-frequency cutoff frequency required to meet these conditions occurs between infinite plane emitters only if one of the emitters is operating strongly temperature-limited. This ''unsaturated state'' of the gas is precisely specified by the value of an integration constant in the expression for the d-c electric field in the gas. The plasma resonance frequency is found to be constant everywhere in the gas, despite the fact that the electron density varies widely between the emitters. In no other states, ''saturated'' or ''supersaturated'', does such a plasma frequency and the consequent approximately adiabatic propagation exist. In other words, these states show practically no real medium-like behavior. (Author)

AD-401 719 Div. 25
(TISTM/BRW) OTS price $2.60

Aerospace Corp., Los Angeles, Calif.
PHOTOELASTIC ANALYSES OF THERMAL STRESSES IN NOTCHED SHELLS AND BEAMS,
by C. H. Tsao, A. Ching, and S. Okubo. 26 Feb 63, 21p. incl. illus. 4 refs. (Rept. no. TDR-169(3230-11)TN-11)
(Contract AF 04(695)169)
(SSD TDR 63-36) Unclassified report

DESCRIPTORS: *Structural shells, Structures, Mathematical analysis, Photoelasticity, Nose cones, Cylindrical bodies, Beams (Structural), Metal plates, Thermal stresses.

Progress in the program to determine the optimum notch geometry to minimize the thermal stresses in a notched nose cone or leading edge is discussed. Theoretical analyses, which have been made on the thermal stresses in shells under nonlinear temperature gradients, show that shells behave like beams. Photoelasticity was selected as the most accurate and suitable method for investigating notch geometries. The creep properties of Homalite 100, which is used for the photoelastic models, were studied, and the results show that the auto-calibration method, applicable only when the amount of creep is proportioned to stress, is true for Homalite 100. The results of an investigation of a number of notched beams by photoelastic methods are presented. (Author)

AD-401 729 Div. 25
(TISTP/JW) OTS price $16.00

Foreign Tech Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
TRANSACTIONS OF THE PHYSICS INSTITUTE,
ed. by D. V. Skobel'tsyn. 21 Mar 63, 244p. incl. illus, 58 refs. (Trans. no. FTD-TT-62-958 from Trudy Fizicheskogo Instituta, vol. 10, Izdatel'stvo Akademii Nauk SSSR, 1958)
Unclassified report

DESCRIPTORS: *Physics, Supersonic flow, Motion, Particles, Oscillation, Magnetic fields, Scientific research.

AD-401 742 Div. 25
(TISTP/FR) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE MAGNETIC FIELD, EXCITED BY THE PRIMARY WINDING, IN THE AIR CAP OF AN INDUCTION MACHINE WITH A CURVED STATOR,
by A. A. Lebedev. 18 Mar 63, 15p. incl. illus. 2 refs. (Trans. no. FTD-TT-63-157 from Russian Periodical, Electromekhanika, No. 5, 1959, pp. 14-23.)
Unclassified report

DESCRIPTORS: *Magnetic fields, Induction motors, Coils.

An evaluation is given of magnetic fields excited in the air gap by a stator having the new type of winding. The problem is solved on the basis of the following assumptions: (1) the steel of the stator and rotor is not saturated and has a relative permeability mu - const; (2) the reluctance of the steel of the stator and rotor in a radial direction is allowed for by a corresponding increase of the air gap. (Author)

AD-401 758 Div. 25
(TISTP/WH) OTS price $3.00

Sandia Corp., Albuquerque, N. Mex.
SUMMARY OF SHERWOOD ACTIVITIES. SUPPLEMENTARY REPORT.
15 Feb 63, 37p. incl. illus. tables (Rept. no. NP-12651, Suppl. to Rept. no. NP-12171, AD-291 159)
Unclassified report

DESCRIPTORS: *Plasma physics, *Magnetic pinch, *Particle accelerators, *Deuterons, Electron guns, Thermonuclear reactions, Ions.

AD-401 765 Div. 25
(TISTP/WH) OTS price $3.60

AVCO Everett Research Lab., Everett, Mass.
ELECTRONIC TRANSITION MOMENTS FOR AIR MOLECULES,
by J. C. Keck, R. A. Allen and R. L. Taylor. Mar 63, 31p. incl. illus. 46 refs. (Research rept. no. 149)
Unclassified report

DESCRIPTORS: *Electron transitions, *Air, *Band spectrum, *Infrared radiation, Absorption spectrum, Nitrogen, Oxygen, High-temperature research, Quantum mechanics, Diatomic molecules, Molecular spectroscopy.

Electronic transition moments for molecular bands which radiate strongly in air in the temperature range 4000 to 9000 K were determined from available experimental data in conjunction with recently computed Frank-Condon factors. An analysis was also made of the radiation in the infrared leading to effective Z squared values for the free-free Kramers' radiation produced by electrons scattered from neutrals. (Author)

AD-401 805 Div. 25, 33
(TISTP/WH) OTS price $4.60

Army Tank-Automotive Command, Detroit, Mich.
A PRELIMINARY ANALYSIS OF THE FORCE SYSTEM ACTING ON A RIGID WHEEL,
by Ervin Hegedus. Apr 62, 45p. incl. illus. table, 26 refs. (Rept. no. LL-74)
(DA Proj. no. 570-05-001)
Unclassified report

DESCRIPTORS: *Vehicle wheels, *Soils, *Load distribution, *Sand, Friction.

Normal pressure distribution measurements under rigid wheels operating in sand and loam are reported in this paper. The effect of frictional (tangential) forces are also considered by means of the Friction Circle Method. Experimental results justify the practicability of the theoretical assumption made. The necessary direction of further research is outlined. (Author)

AD-401 812 Div. 25
(TISTP/WH) OTS price $2.60

Wyoming U., Laramie.
OPTIMIZING THE DYNAMIC SHAPE OF A VIBRATING BEAM,
by Richard H. Jessen. Jan 63, 22p. incl. illus. tables, 7 refs.
Unclassified report

DESCRIPTORS: *Cantilever beams, *Vibration, Deflection, Energy, Frequency, Mechanics.

Two approximate frequency-determining methods are developed which apply to the following problems: (a) determining the optimum dynamic shape of a cantilever beam with a mass load at the free end, and (b) determining the necessary approach to accurately optimize the dynamic shape of a simply supported beam with a center mass load. (Author)

AD-401 831 Div. 25, 15
(TISTP/MFA) OTS price $8.10

RAND Corp., Santa Monica, Calif.
TRANSIENT SOUND PROPAGATION IN A SIMPLE MODEL OF A TRIPLE-LAYERED MEDIUM,
by Allan D. Pierce. Apr 63, 84p. incl. illus. 23 refs. (Memo. no. RM-3478)
Unclassified report

DESCRIPTORS: *Sound transmission, *Wave transmission, *Mathematical models, Propagation, Atmosphere, Scattering, Excitation, Series, Functions, Fourier analysis.

A theoretical study was made of the transient sound propagation from a point source in a triple-layered medium consisting of a homogeneous fluid layer sandwiched between two similar half spaces of the same density but of higher sound speed. The source spectrum is such that a large number of normal modes are excited. Both source and receiver are assumed to be in the same half space. The general solution consists of a direct wave, a wave reflected from the near edge of the center layer, a lateral wave, and the normal and complex mode waves. At large distances r the normal mode waves dominate. It is found that one may relate frequency, phase velocity, group velocity, and excitation amplitudes parametrically, and, on the basis of this, the variation of the characteristics of the normal modes with mode number n is studied. Similar methods can be used to study the complex modes. Each normal mode is found to carry a limited band of frequencies -- the band width for higher order modes being approximately proportional to n-1. (Author)

AD-401 865 Div. 25
(TISTP/MFA) OTS price $4.60

Florence U. (Italy).
CERENKOV RADIATION FROM A CHARGED PARTICLE IN UNIFORM STRAIGHT MOTION THROUGH A PARTICULAR STRATIFIED MEDIUM,
by L. Ronchi and A. M. Scheggi. Nov 62, 40p. incl. illus. (Technical note no. 2)
(Grant AF EOAR 62-103)
(AFCRL 63-80) Unclassified report

DESCRIPTORS: *Cerenkov radiation, *Charged particles, Metal films, Dielectrics, Electromagnetic fields, Velocity, Harmonic analysis, Bessel functions, Fourier analysis, Scattering, Targets.

A particular stratified medium is considered, constituted by a number of thin, plane, parallel and equispaced metallic films. The spacing between the films is filled with a perfect dielectric. A charged particle, in uniform straight motion goes through the structure, normaly, to the films. The velocity of the particle is above the Cerenkov threshold for the dielectric. The expression of the radiation is worked out as a function of different parameters. The radiation pattern is plotted in a number of particular cases. (Author)

AD-401 875 Div. 25
(TISTP/GRW) OTS price $3.60

Naval Radiological Defense Lab., San Francisco, Calif.
XENON FLASHTUBES AS SOURCES OF THERMAL RADIATION,
by Kenneth A. Lincoln. 23 Jan 63, 37p. incl. illus. tables, 33 refs. (Rept. no. NRDL-TR-617)
(DASA 1342) Unclassified report

DESCRIPTORS: *Flash lamps, *Xenon lamps, *Thermal radiation, Pyrolysis, Cellulose acetates, Experimental data, Test equipment, Calorimeters, Intensity, Sources.

Thermal radiative properties of xenon flashtubes were studied by measuring radiant energies per flash and peak irradiances incident on small objects located at the center of selected helical flashtubes. Methods are described for determining these properties by employing black-body calorimeters in conjunction with oscilloscopic presentation of intensity vs time. Thermal pulses were quite reproducible and are of the order of 1.0 to 1.7 cal/sq cm per thousand koules of electrical input energy depending on the type of flashtube. Peak irradiances of over 7000 cal/sq cm arc sec were observed, and the influence of varying the capacitance and voltage was also determined. In addition, some electrical characteristics of the flashtubes, such as current and resistance were included in the measurements. (Author)

AD-401 888 Div. 25, 8
(TISTP/PCR) OTS price $2.60

Air Force Cambridge Research Labs., Bedford, Mass.
LASERS--A BASIC DISCUSSION OF TYPES, PROPERTIES, AND PRINCIPLES,
by C. Martin Stickley. Jan 63, 23p. incl. illus. 6 refs. (Rept. no. AFCRL-63-1)
(Proj. 4645)
Unclassified report

DESCRIPTORS: *Lasers, Construction, Ruby, Absorption, Gases, Radar, Diodes, Design.

This report describes the basic aspects of a laser. It includes a quantitative discussion of the major properties and the different types of lasers, as well as the basic laser mechanism - stimulated emission. Not included are detailed discussions of items that will be soon outdated. Several applications are presented in order to illustrate the properties of the laser. (Author)

AD-401 890 Div. 25
(TISTP/PCR) OTS price $11.00

Cruft Lab., Harvard U., Cambridge, Mass.
ELECTRIC FIELD EFFECTS IN PARAMAGNETIC RESONANCE. Technical rept,
by E. B. Royce. 12 Feb 63, 1v. incl. illus. tables, refs. (Technical rept. no. 379)
(Contracts Nonr-186616, Proj. NR 372-012 and Nonr-186628, Proj. NR 372-013)
Unclassified report

DESCRIPTORS: *Paramagnetic resonance, *Electric fields, Dipole moments, Electric moments, Test methods, Test equipment, Spectrum analyzers, Absorption, Ruby, Magnesium compounds, Oxides, Chromium, Aluminum compounds, Dielectrics, Crystals, Theory, Electrons, Microwave equipment, Tensor analysis, Titanium.

The electric field effects in paramagnetic resonance consist of shifts in resonance frequency produced by the application of a uniform electric field to the magnetic resonance sample. These electric field shifts arise through variations in the crystal field splittings under the influence of the applied electric field. In a non-piezoelectric sample, two mechanisms are considered to be important in producing the electric field induced variation in crystal field. The optical mode ionic polarization of the crystal lattice, in which the anion and cation sublattices move with respect to each other, produces a variation in the local crystalline environment of the magnetic ion and, hence, in its crystal field interaction; the electronic polarization of the magnetic ion alters its interaction with its crystalline surroundings, again producing a variation in the crystal-field interaction. Effects of electrostriction and piezoelectric distortion are mentioned but not treated in this work. (Author)

AD-401 894 Div. 25, 15
(TISTP/PCR) OTS price $2.60

Cruft Lab., Harvard U., Cambridge, Mass.
SCATTERING OF UNIDIRECTIONAL SURFACE WAVES. Technical rept.,
by S. R. Seshadri. 15 Feb 63, 20p. incl. illus. 3 refs. (Technical rept. no. 402)
(Contract Nonr-186632, Proj. NR-371-016)
Unclassified report

DESCRIPTORS: *Electromagnetic waves, Reflection, Wave transmission, Frequency, Equations, Dielectric properties, Matrix algebra, Plasma physics, Integral transforms, Antenna radiation patterns, Scattering, Mathematical analysis.

A perfectly conducting plane screen embedded in a gyrotropic medium is shown to be able to support a unidirectional surface wave. Such a surface wave is assumed to be incident on the top of a semi-infinite screen. At the edge, the incident power is converted partly into a reflected surface wave which travels on the bottom of the screen and partly into a space wave. The angular distribution of the radiated energy as well as the power-reflection and the power-transmission coefficients are evaluated. Total reflection is shown to occur for a certain band of frequencies. (Author)

AD-401 904 Div. 25
(TISTP/FEM) OTS price $3.60

Mathematics Research Center, U. of Wisconsin, Madison.
STEADILY MOVING SOURCES ON THE INTERFACE BETWEEN TWO MEDIA,
by Michael Papadopoulos. Nov 61, 35p. incl. illus. 5 refs. (MRC technical summary rept. no. 274)
(Contract DA 11-022-ORD-2059, In cooperation with Melbourne U. (Australia))
Unclassified report

DESCRIPTORS: *Propagation, *Sound transmission, Sound, Velocity, Density, Partial differential equations, Integral equations, Subsonic flow, Supersonic flow, Acoustics.

The propagation of acoustic disturbances generated by a moving point source, in the presence of a plane refracting surface is discussed. It is specified that the source moves, with a constant velocity V, parallel to a plane surface separating two media of different densities and sound velocities. (Author)

AD-402 072 Div. 25
(TISTP/RD) OTS price $19.75

Oklahoma U. Research Inst., Norman.
AN INVESTIGATION OF RADIANT HEAT TRANSFER IN ABSORBING, EMITTING AND SCATTERING MEDIA,
by Tom J. Love, Jr. Jan 63, 303p. incl. illus. 38 refs.
(Contract AF 33(657)8859, Proj. 7116)
(ARL 63-3) Unclassified report

DESCRIPTORS: *Heat transfer, *Scattering, Particles, Particle size, Thermal diffusion, Absorption, Transport properties, Thermodynamics, Mathematical analysis.

The effect of anisotropic scattering on radiant heat transfer is examined. The equation of transfer for a scattering, absorbing, and emitting medium is simplified by restricting the analysis to axially symmetric, plane parallel geometry. The scattering media are assumed composed of spherical particles of uniform diameter and complex refractive index. The scattering functions are taken from the literature and are the result of application of the Mie theory of electromagnetic scattering. Results are presented for scattering by spheres composed of material having refractive indices of 1.25 - 1.25i and 2.00 - 0.60i, corresponding roughly to iron and carbon respectively, and the case of isotropic scattering. The results include the effect of variations of surface reflectivity, optical spacing, and particle size to wave length ratio. (Author)

AD-402 077 Div. 25
(TISIA/EJH) OTS price $3.60

David Sarnoff Research Center, Princeton, N. J
INVESTIGATION OF CARRIER INJECTION ELECTROLUMINESCENCE.
Semiannual scientific rept. no. 3, 15 July 62-15 Jan 63,
by A. G. Fischer, W. H. Fonger, and A. S. Mason. 15 Feb 63, 30p. incl. illus. 10 refs.
(Contract AF 19(604)8018, Proj. 4608)
(AFCRL 63-62) Unclassified report

DESCRIPTORS: *Semiconductors, *Electroluminescence, *Luminescence, Solid state physics, Crystal growth, Single crystals, Films, Vapor plating, Manufacturing methods, Zinc compounds, Cadmium compounds, Gallium compounds, Tellurides, Selenides, Sulfides, Impurities, Laboratory equipment, Broadband, Modulation, Nitrides, Phosphides, Aluminum compounds.

The following advances in the growth of crystals of II-VI compounds (ZnSe and ZnTe) and in preparing electroluminescent junctions are related: A magnetic Czochralski puller for temperatures where magnets normally lose their susceptibility was constructed. Experiences with the epitaxial growth of ZnSe and ZnTe are described. N-type ZnSe crystals exhibit light absorption due to free carriers. Electroluminescent emission at non-ohmic contacts is due to impact-ionization excitation. The new concept of tunnel-injection electroluminescence has been reduced to practice; light emission from CdS layers was obtained. A new effect, electrical modulation of photoluminescence in CdS, was discovered. The compounds AlP and BP are apparently not miscible. The value for the lattice constant of AlP was corrected. Injection electroluminescence was observed in boron phosphide crystals. The methods for evaporation of ZnSe films on hot substrates were improved, and the light scattering and luminescent properties of such films were studied. (Author)

AD-402 106 Div. 25, 15
(TISTP/MFA) OTS price $3.60

Space Technology Labs., Inc., Redondo Beach, Calif.
A DYNAMICAL THEORY OF BARYONS,
by H. C. Corben. Dec 63, 31p. incl. tables, 5 refs. (Rept. no. 8665-6002-RU-000)
(Contract Nonr-37600, Proj. NR 013-110)
Unclassified report

DESCRIPTORS: *Quantum statistics, *Field theory, *Nuclear spins, Nuclear resonance, Neutrons, Protons, Antiprotons, Quantum mechanics, Charged particles, Operators (Mathematics), Hyperons, Nuclear particles, Elementary particles, Relativity theory.

AD-402 112 Div. 25
(TISTP/MFA) OTS price $1.10

Ballistic Research Labs., Aberdeen Proving Ground, Md.
TWO WAVELENGTH, STREAK INTERFEROMETRY OF AN IONIZED, HEAVY GAS,
by F. D. Bennett, H. S. Burden, and D. D. Shear. Jan 63, 17p. incl. illus. 3 refs. (Memo. rept. no. 1448)
Unclassified report

DESCRIPTORS: *Schlieren photography, *Gas discharges, Plasma jets, Gas ionization, Interferometers.

The problem of measuring interferometrically both the mass density and the electron concentration in an ionized gas requires interferograms at 2 different wavelengths. Transient ionized gases can be examined by the method of streak interferometry. By inserting a dichroic mirror-divider and duplicate optical trains with appropriate filters, the basic streak interferometer can be modified to produce 2, simultaneous, streak interferograms at selected wavelengths. (Author)

AD-402 212 Div. 25
(TISTP/WH) OTS price $1.60

Brown U., Div. of Applied Mathematics, Providence, R. I.
A GENERALIZATION OF THE BELTRAMI STRESS FUNCTIONS IN CONTINUUM MECHANICS,
by M. E. Gurtin. Apr 63, 18p. refs. (Technical rept. no. 20)
(Contract Nonr 56225, Proj. NR-064-431)
Unclassified report

DESCRIPTORS: *Stresses, *Tensor analysis, *Continuum mechanics, Mathematical analysis.

AD-402 126 Div. 25
(TISTP/RD) OTS price $2.60

Columbia U., New York.
SOME PROBLEMS IN PHENOMENOLOGICAL FRACTURE MECHANICS.
Final rept., Mar 61-Mar 62 on Metallic Materials,
by A. M. Freudenthal and M. P. Bieniek. Mar 63, 18p. incl. illus. 7 refs.
(Contract AF 33(616)6112, Proj. 7351)
(ASD TDR 63-221) Unclassified report

DESCRIPTORS: *Continuum mechanics, *Fracture (Mechanics), Mathematical analysis, Mechanical properties, Stresses, Elasticity, Plasticity, Brittleness, Deformation, Theory, Solids.

Certain problems of propagation of microcracks (Griffith cracks) and fracture cracks are considered. The phenomenological approach based on the concept of the continuum and the methods of mechanics of solids is used. An energy criterion for equilibrium of cracks in inelastic solids is formulated in the form which reduces to Griffith's criterion in the case of brittle solids and, with certain simplifying assumptions, results in Orowan's criterion for elastic-plastic solids. Another criterion is derived from the analysis of the stresses at the edge of a crack. This stress criterion is also extended over time-dependent crack resistance by relating it to certain characteristics of the inelastic deformation. (Author)

AD-402 215 Div. 25
(TISTP/PCR) OTS price $1.10

Space Technology Labs., Inc., Los Angeles, Calif.
A NEW APPROACH TO THE THEORY OF BARYONS,
by H. C. Corben. Jan 63, 7p. incl. tables, 4 refs.
Unclassified report

DESCRIPTORS: *Quantum mechanics, *Particles, Mathematical analysis, Equations, Operators (Mathematics), Spin, Charged particles, Mass number, Resonance, Theory, Relativity theory, Dynamics.

AD-402 280 Div. 25
(TISTP/WH) OTS price $2.60

Harvard U., Cambridge, Mass.
TIME-INDEPENDENT PERTURBATION THEORY BY GAUGE TRANSFORMATIONS,
by Jeremy I. Musher. 1962, 24p. 23 refs.
Unclassified report

DESCRIPTORS: *Quantum mechanics, *Perturbation theory, Partial differential equations, Green's function.

It is shown that a given solution Ψ_0 of a one-electron Schrodinger equation for Hamiltonian $\mathcal{H}_0$ is also the solution to the Schrodinger equation for a particular gauge-transformed Hamiltonian when any given perturbation $\mathcal{H}_1$ is added to $\mathcal{H}_0$. This transformation is obtained from solutions to inhomogeneous partial differential equations similar to those of Dalgarno and Schwartz and it has the virtue of giving the energy expectation value in a particularly simple form. The corresponding many-electron gauge-transformation is also treated, and despite the fact that the equations obtained are in general not exactly soluble, the procedure does provide a useful visualization of the electron correlation contributions to the energy. An approximation for multi-center wave functions, which amounts to choosing a different gauge for each center, is also presented and the error introduced is discussed. (Author)

AD-402 282 Div. 25, 4
(TISTM/ODN) OTS price $1.10

Harvard U., Cambridge, Mass.
THE FERMI-CONTACT CONTRIBUTION TO THE PROTON-DEUTERON COUPLING CONSTANT IN HD,
by J. I. Musher. 1962, 6p. 15 refs.
(Sponsored by Office of Naval Research)
Unclassified report

DESCRIPTORS: *Hydrogen, Deuterons, Deuterium, Perturbation theory, Protons, Quantum mechanics, Electrons, Nuclear spins, Molecular properties.

AD-402 283 Div. 25
(TISTM/ODN) OTS price $1.60

Harvard U., Cambridge, Mass.
THE MICROWAVE SPECTRUM AND STRUCTURE OF NSF,
by William H. Kirchhoff and E. Bright Wilson, Jr. 1962, 12p. illus. tables, 18 refs.
(Sponsored by Office of Naval Research)
Unclassified report

DESCRIPTORS: *Microwave spectroscopy, *Molecular structure, Sulfur compounds, Nitrogen compounds, Fluorides, Microwave frequency, Tables, Spectrum analyzers, Chemical reactions, Chemical bonds, Synthesis (Chemistry), Molecular properties, Hydrolysis.

The microwave spectrum of the compound reported to be SNF was investigated in order to remove uncertainty regarding its structure. The compound was found, contrary to previous notions, to have the (bent) structure N-triple bond-SF with the following molecular dimensions: d(SF) = 1.646 ± 0.01 angstroms, d(SN) = 1.446 ± 0.01 angstroms and NSF = 116 deg. and 52 min. ± 15 min. These dimensions are compatible with the force constants of the bonds as determined from previous infrared work. The quadrupole coupling constants are eq sub a Q = 1.66 ± 0.05 Mc and eta = +5.86 ± 0.05. The hydrolysis of NSF to give HNSO was also confirmed. (Author)

AD-402 303 Div. 25, 8
(TISTP/WH) OTS price $1.60

Kiruna Geophysical Observatory (Sweden).
NORTHERN LATITUDE PROPAGATION.
Final rept.,
by Ludwik Liszka. 23 Mar 63, 14p. incl. table, refs.
(Contract AF 61(052)601)
(AFCRL 63-462) Unclassified report

DESCRIPTORS: *Radio signals, *Distortion, *Magneto-optic effect, *Diurnal variation, Periodic variations, Terrestrial magnetism, Satellites, Ionosphere, Very high frequency.

Satellite recordings made at Kiruna Geophysical Observatory at frequencies 20 and 54 Mc/s during the last three years are investigated with respect to the occurrence of scintillation with emphasis on the 54 Mc/s results. Studies of diurnal and seasonal variations of scintillation at 54 Mc/s show that the shape of the diurnal curve is dependent on magnetic activity and that seasonal variations are not important. The depth of scintillation at 54 Mc/s is better correlated with magnetic activity than at 20 Mc/s. There exists a difference between daytime and nighttime scintillation. A statistical analysis of the diffraction pattern produced by radio waves from Transit IV A at 54 Mc/s is also presented. The most important result is the evidence that auroral zone scintillation may be produced at altitudes below F-maximum. Investigation of the shape of ionospheric irregularities have shown that if these are assumed to be two-axial ellipsoids orientated along the magnetic field lines, axis ratios of order of magnitude 10 will be obtained. (Author)

AD-402 307 Div. 25
(TISTP/PCR) OTS price $9.60

Bonn U. (Germany).
CURRENT TRANSITION GAS - METAL. III: STABILITY OF GLOW- AND ARC-DISCHARGES,
by G. Ecker, W. Kroll and O. Zoller. 31 Dec 62, 116p. incl. illus. 107 refs. (Technical rept. no. FTR III)
(Contract DA-91-591-EUC-1764)
Unclassified report

DESCRIPTORS: *Glow discharges, *Electric discharges, Mathematical analysis, Plasma physics, Equations, Numerical analysis, Anodes, Cathodes, Entropy, Stability, Electric arcs.

Contents:
The concept of stability
Mode analysis of the stability problem
Variational principle analysis of the stability problem
Stability considerations in plasma physics
Basic equations, boundary conditions and approximations
Stationary modes of the glow- and arc-discharge
Thermal instability of the glow column
Instability of the cathodic part of the glow discharge
Stability principles in gaseous electronics

AD-402 321 Div. 25
(TISTP/RD) OTS price $3.60

Stanford Research Inst., Menlo Park, Calif.
THE PENETRATION OF A DECELERATED CHARGED-PARTICLE BEAM INTO A PLASMA,
by H. H. C. Chang and S. V. Yadavalli. Dec 61, 36p. 13 refs.
(Contract Nonr 272800)
Unclassified report

DESCRIPTORS: *Charged particles, *Particle beams, Mathematical analysis, Gas ionization, Electron density, Plasma physics, Penetration, Deceleration.

Assuming a decelerated charged particle beam penetrating a uniform plasma, a relation for the growth rate of electrostatic instabilities is obtained. It is shown that the growth rate in a decelerated beam case is always higher than in a uniform one. An experimental method of determining the electron plasma frequency of the plasma and the decelerating parameters beta and alpha is also suggested. (Author)

AD-402 328 Div. 25, 2
(TISTP/RD) OTS price $2.60

Technische Hochschule, Darmstadt (Germany).
SOME PROBLEMS OF ATMOSPHERIC DIFFUSION ON VERY LARGE SCALE,
by F. Mesinger. 31 Oct 62, 27p. incl. illus. table, refs. (Technical note no. 2)
(Contract AF 61(052)366)
(AFCRL 63-284) Unclassified report

DESCRIPTORS: *Atmospheric motion, *Particles, Atmosphere, Turbulence, Meteorological phenomena, Diffusion.

This report includes:
REMARKS ON THE BEHAVIOR OF COMPUTED AIR TRAJECTORIES NEAR THE BOUNDARIES OF AN OCTAGONAL AREA,
by F. Mesinger. 31 Oct 62 (Technical note no. 3)

Making use of a 500 mb numerical forecast some problems of atmospheric large-scale diffusion are investigated. The expansion of various sets of clusters of particles is compared with the predictions based on the similarity theory of homogeneous turbulence. The spreading rates were in the beginning of the period of the forecast in a good agreement with the theoretical predictions, but later on they dropped to values considerably smaller than the predicted ones. The reasons for such a behaviour are discussed. The intrinsic property of turbulence to disturb initially equidistantly spaced particles until the random distribution is achieved is investigated with respect to its time scale. It is found that the atmosphere needs about 6 days to move the initially rectangularly spaced particles 381 km apart to the positions which form the distribution differing 10% from the random distribution. (Author)

AD-402 434 Div. 25, 30
(TISTP/PCR) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
NEW LOW VOLTAGE SOURCES OF VACUUM ULTRAVIOLET,
by Ye. M. Akimov. 15 Mar 63, 15p. incl. illus. 41 refs. (Trans. no. FTD-TT-62-1913 from Vestnik Moskovskogo Universiteta, Seriya Matematiki, Mekhaniki, Astonomii, Fiziki, Khimii, No. 4, pp. 109-118, 1958)
Unclassified report

DESCRIPTORS: *Ultraviolet radiation, Electric arcs, Sparks, Test equipment, Discharge tubes, Circuits, Vacuum apparatus.

Vacuum ultraviolet is called the optical emission with a wave length of from 1850 angstroms to several angstrom units, filling-in in the scale of electromagnetic waves the interval between ordinary ultraviolet and the zone of soft x-rays. From the viewpoint of suitability to excite vacuum ultraviolet all optica emission sources can be divided into five groups, which are described in the report. (Author)

AD-402 436 Div. 25
(TISTP/MFA) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PRINCIPLE OF THE MOLECULAR AMPLIFIER AND GENERATORS OF COHERENT LIGHT,
by B. M. Yavorskiy. 1 Apr 63, 13p. incl. illus. 13 refs. (Trans. no. FTD-TT-62-1822 from Svstotekhnika, Nr. 2, pp. 1-5, 1962)
Unclassified report

DESCRIPTORS: *Lasers, *Molecular beams, Photons, Atomic energy levels, Glow discharges, Plasma oscillations, Resonance absorption, Electromagnetic waves, Energy.

AD-402 463 Div. 25
(TISTM/CCH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ACOUSTIC CONDUCTIVITY OF A RIGID BURNING SURFACE,
by S. S. Novikov and Yu. S. Ryazantsev. 18 Mar 63, 10p. 17 refs. (Trans. no. FTD-TT-62-1690 from Zhurnal Prikladnoy Mekhaniki i Tekhnicheskoy Fiziki, Nr. 6, pp. 73-77, 1961)
Unclassified report

DESCRIPTORS: *Flames, *Acoustics, *Surfaces, Burning rate, Thermal conductivity, Acoustic properties.

AD-402 467 Div. 25
(TISTM/WA) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command Wright-Patterson Air Force Base, Ohio.
IONIZATION METHODS OF OBTAINING HIGH VACUUM,
by E. M. Reykhrudel' and G. V. Smirnitskaya. 12 Mar 63, 10p. incl. illus. 7 refs. (Trans. no. FTD-TT-62-1914 from Priroda, No. 9, pp. 87-91, 1957)
Unclassified report

DESCRIPTORS: *Gas ionization, *Vacuum pumps, Low-pressure research, Ions, Gas discharges, Ionic current, Cathode ray tubes.

AD-402 470 Div. 25
(TISTP/RD) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
STATIONARY FLOW OF A CONDUCTING MEDIUM IN THE PRESENCE OF A MAGNETIC FIELD,
by Ya. P. Kotov, G. Ya. Umarov, and D. F. Fayzullayev. 29 Mar 63, 9p. 3 refs. (Trans. no. FTD-TT-63-205 from Russian periodical, Izvestiya Akademiy nauk UzSSR, seriya fiziko-matematicheskikh nauk, No. 3, pp. 75-80, 1962)
Unclassified report

DESCRIPTORS: *Mixtures, *Fluid flow, Differential equations, Gas flow, Magnetic fields, Partial differential equations, Electrical conductance.

26. PRODUCTION AND MANAGEMENT

AD-401 158 Div. 26, 17
(TISTM/AMS) OTS price $1.60

Watertown Arsenal Labs., Mass.
EVALUATION OF CO-REDUCED DEPLETED URANIUM ALLOY,
by Ernest N. Kinas and F. J. Rizzitano. Mar 63, 10p. incl. illus. tables (Rept. no. WAL TR 420.5/1)
Unclassified report

DESCRIPTORS: *Uranium alloys, *Forging, Molybdenum alloys, Titanium alloys, Manufacturing methods, Mechanical properties, Hot working, Heat treatment, Impact shock, Shock resistance.

A study was conducted to determine the advantage of forging depleted uranium components directly from co-reduced dingot stock. Two types of alloys were investigated: U-8% Mo and U-8% Mo-1% Ti. To provide a basis of comparison, some of the co-reduced dingot stock was remelted into ingots and was hot worked in the same manner as the material from the dingot. Mechanical properties were obtained to determine the effect of both methods. Photomicrographs and photmacrographs were obtained to compare the effect of different processing methods and heat treatments on metallurgical structure. The hot-working methods used were upset forging and cogging. Data obtained from this investigation indicated that co-reduced material could be forged and heat treated directly to give good combinations of mechanical properties. Remelting of co-reduced hot working material followed by hot working resulted in only slightly higher yield strength. (Author)

AD-401 176 Div. 26, 14, 17
(TISTM/AMS) OTS price $3.60

Armour Research Foundation, Chicago, Ill.
WELDING OF ALUMINIZED STEEL.
Final rept., 1 July 59-30 June 60,
by David C. Brown and Harry Schwartzbart.
12 July 60, 33p. incl. illus. tables (Rept. no. ARF 2185-12)
(Contract NObs-77183)
Unclassified report

DESCRIPTORS: *Arc welding, *Steel, *Ship plates, Arc welds, Welding fluxes, Welding rods, Electrodes, Manufacturing methods, Porosity, Brittleness, Impact shock, Shock resistance, Tensile properties, Hydrogen, Ductility, Aluminum coatings.

The manual metallic arc welding of aluminized steel was investigated to determine the suitability of aluminized steel for ship construction from the standpoint of welding. Various electrodes were investigated, but only the low-hydrogen types proved capable of depositing porosity-free welds. Preliminary investigation of Grade M plate coated with aluminum alloy K726A (2 1/2% silicon) and welded with low-hydrogen electrodes was more encouraging than that of the Grade M plate coated with 1100 aluminum alloy. Specifically, the welds had considerably more ductility and higher strength, and were free of the extremely hard aluminum-rich compounds Fe_2Al_5 and $FeAl_3$ found in the welds of the 1100 aluminum-coated steel. Additional work is required to confirm these results which would then open the possibility of making successful, tough welds in aluminized plate by modifying the composition of the aluminum alloy coating. (Author)

AD-401 194 Div. 26, 17
(TISTM/AMS) OTS price $1.60

Lyon Inc., Detroit, Mich.
DEEP DRAWN AUSFORMING DEVELOPMENT PROGRAM, 12 DIA. ROCKET MOTOR CHAMBERS.
General rept. no. 5 for period ending 31 Mar 63.
31 Mar 63, 12p.
(Contract NOw 60-0634)
Unclassified report

DESCRIPTORS: *Drawing (Machine processing), *Austenite, *Hot working, Mechanical working, Heat treatment, High temperature research, Tensile properties, Rocket components, Cold working, Ductility, Metal forming, Deformation.

Twenty-five forged billet blocks of 300-M steel were processed up to the operation just prior to ausforming. Six of these chambers were given the final fabrication operations by cold drawing to provide test cases which can be quenched and tempered in the normal manner. Five of the cases were hardened and shipped to the U. S. Naval Weapons Plant for testing. Laboratory studies were made of the strength and ductility, as measured by a tensile test, of austenite at 1000 F. In addition, the Scientific Laboratory of Ford Motor Company conducted studies of the ausformed properties of the particular heats of 300-M steel to be used for this program. Although the program was delayed, due to problems during fabrication of the ausforming die assembly, these problems were solved and fabrication of the die assembly was completed. (Author)

AD-401 319 Div. 26
(TISTE/OHD) OTS price $.50

Harry Diamond Labs., Washington, D. C.
FLUID AMPLIFICATION. 8. USE OF EPOXY CASTINGS FOR FLUID AMPLIFIER DESIGN,
by David S. Marsh and Edward V. Hobbs. 11 Feb 63, 19p. incl. illus. (Rept. no. TR-1102)
(Proj. DA-5N03-01-003; HDL Proj. 31100)
Unclassified report

DESCRIPTORS: *Servo amplifiers, *Amplifiers, *Castings, Manufacturing methods, Test methods, Hydraulic servomechanisms, Fluids, Epoxy plastics.

An adjustable master unit was used to make series of cast-epoxy fluid amplifiers that incorporate incremental dimensional changes. Subsequent unit testing identified the best geometry for a given performance requirement. The process provides an inexpensive means of precisely producing the numerous units necessary for empirical design studies. The basic rubber mold and epoxy casting process is described, as well as the adjustment of the master unit. Some other uses of epoxy castings in the fluid amplifier field are also described. (Author)

AD-401 325 Div. 26
(TISTM/LMH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
OPTIMUM GEOMETRICAL RATIOS IN INDUCTION PUMPS FOR LIQUID METALS,
by N. M. Okhremenko. 15 Feb 63, 19p. incl. illus. table, 14 refs. (Trans. no. FTD-TT-62-1724 from Russian Periodical, Elektrichestvo, Nr. 9, pp. 10-16, 1961)
Unclassified report

DESCRIPTORS: *Pumps, Mathematical analysis, Design, Hydraulic systems, Pressure, Effectiveness, Electromagnetic pumps, Liquid metal pumps, Operation.

AD-401 336 Div. 26, 17
(TISTM/AMS) OTS price $3.60

General Dynamics/Convair, San Diego, Calif.
EFFECT OF ARTIFICIAL AGING ON RIVET STRENGTHS. Report on Material - Aluminum - 2024-T6,
by H. H. Stier, G. J. Langford, and H. C. Turner.
20 June 58, 1v. incl. illus. tables (Rept. no. 8926-134; 57-922)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Aging (Materials), *Aluminum alloys, *Rivets, Heat treatment, Wire, Shear stresses, Experimental data, Tensile properties, Sheets, Cladding, Tests, Manufacturing methods.

Conventional ice-box stored as-quenched 2024 aluminum alloy rivets are troublesome in production because of their instability at room temperatures. The instability results from natural aging and resulting hardening which interferes, with rivet usefulness. Artificial aging at some elevated temperature was considered as a means for stabilizing rivet properties throughout their production and use. Preliminary tests indicated that satisfactory material properties could be developed in 2024 rivets by aging them at 398 F for 3-3/4 hours, however, question remained regarding the reproducibility of artificial aging results with commercially produced 2024 aluminum alloy rivet wire. A lengthy test program involving a wide variety of rivet and rivet joint configurations was conducted to verify the validity of the artificially aged rivet and its reproducibility in practice. These tests indicated that the properties spread resulting from a combination of composition, aging, and use conditions resulted in inconsistency in joint behavior, and consequently the artificially aged 2024 aluminum rivet was abandoned. (Author)

AD-401 338 Div. 26
(TISTB/AW) OTS price $4.60

RAND Corp., Santa Monica, Calif.
PLANT MODERNIZATION UNDER CONDITIONS OF COMPETITION AND TECHNOLOGICAL IMPROVEMENT,
by R. Kalaba, A. Kent, and M. Prestrud. Mar 63, 37p. incl. illus. tables, 9 refs. (Research memo. no. RM-3551-PR)
(Contract AF 49(638)700)
Unclassified report

DESCRIPTORS: *Industrial plants, *Management engineering, Models (Simulations), Industrial equipment, Air force logistics command, Programming (Computers), Operations research.

Two important aspects of plant modernization are: (1) technological improvement and (2) plans of competitors for modernization of their plants. The purpose of this paper is to present a novel mathematical model of plant modernization in which both of these factors are considered. In addition to the basic equations themselves, a FORTRAN program for their resolution is given, and the results of some numerical experiments are presented. The primary aim of a mathematico-economical study such as this is to provide a flexible mathematical tool for determining the sensitivity of optimal decision policies to changes in basic assumptions for the physical situation. It is hoped that this will lead to increased understanding of actual plant modernization problems. (Author)

AD-401 725 Div. 26
(TISTM/BRW) OTS price $3.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
MECHANIZATION AND AUTOMATION OF MACHINE (MACHINE TOOL) CONTROL,
by M. A. Elizabetin. 12 Feb 63, 32p. incl. illus. (Trans. no. FTD-TT-62-1246 from Mekhanizatsiya i Avtomatsiya v Mashinostroyenii, Proftekhizdat, Moskva, pp. 58-81, 1961)
Unclassified report

DESCRIPTORS: *Machine tools, Control system, Programming (Computers), Digital computers, Servomechanisms, Hydraulic servomechanisms, Pneumatic servomechanisms, Synchros, Automation.

AD-401 740 Div. 26
(TISTM/ODN) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE PRODUCTION OF LIQUID OXYGEN USING AN AVERAGE-PRESSURE SYSTEM WITH NITROGEN CIRCULATION,
by A. G. Golovintsov, M. B. Stolper, and A. M. Arkharov. 19 Mar 63, 12p. incl. illus. (Trans. no. FTD-TT-63-113 from Russian Periodical, Khimicheskoye Mashinostroyeniye, no. 5, pp. 17-20, 1962)
Unclassified report

DESCRIPTORS: *Liquefied gases, *Oxygen, Cryogenics, Production, Thermodynamics, Nitrogen, Pressure, Air, Gas flow.

AD-401 772 Div. 26
(TISTM/AMS) OTS price $1.60

Arde-Portland Inc., Paramus, N. J.
FABRICATION OF A 65.5-INCH-DIAMETER SIMULATED ROCKET MOTOR CASE BY CRYOGENIC STRETCH-FORMING.
Technical progress rept. no. 2, 13 Nov 62-13 Feb 63,
by George Claffy. 13 Feb 63, 10p. illus. 2 refs.
(Contract AF 33(657)9638)
Unclassified report

DESCRIPTORS: *Rocket cases, *Stretch forming, *Cryogenics, Manufacturing methods, Welding, Tensile properties, Hardness, Impact shock, Aging (Materials), Rupture, Design.

The applicability of the cryogenic stretch-forming process to the fabrication of large rocket motor cases of heavy wall thickness is demonstrated. Effort is directed at 'scaling up' the equipment and techniques to handle the size and wall thickness of a big-boost motor. (Author)

AD-401 776 Div. 26
(TISTB/AW) OTS price $4.60

RAND Corp., Santa Monica, Calif.
THE DESIGN AND OBJECTIVES OF LABORATORY PROBLEM IV,
by I. K. Cohen. Jan 63, 38p. incl. illus. (Research memo. no. RM-3354-PR)
(Contract AF 49(638)700 Proj. RAND)
Unclassified report

DESCRIPTORS: *Management engineering, *Maintenance, Job analysis, Operations research, Data processing systems, Simulation, Training, Air force logistics command.

The fourth Logistics Laboratory Problem (LP-IV) was designed primarily to study improvements in base-level maintenance management and information systems. LP-IV's secondary objectives are to develop a systems training capability for base maintenance management, and advance state-of-the art research in management. The LP-IV study intermixes a number of research techniques, including man-machine simulation, all-computer simulation, and statistical analyses, and employs broad classes of interrelated criteria: direct increase in operational capability, more complete and accurate picture of base maintenance activities within existing resource constraints, more effective use of resources, and improved ability for future planning. On the maintenance policy side, such areas as flight-line dispatch rules, priority systems for shop processing, and shift manning are being explored. On the data processing and data display side, investigations range from refinements of codes and forms used in AFM

66-1 to the design and test of a fully automated and centralized maintenance data processor. This Memorandum also describes the man-machine simulation model planned for LP-IV. The model will be manned by Air Force experienced personnel such as DCM, job control, production control, maintenance plans and schedules, reports and analyses, and shop supervision. The over-all LP-IV design visualizes a benchmark or yardstick case against which proposed policy innovations can be measured. The benchmark case is built with real-world data, abstracted from AFM 66-1.

AD-401 853 Div. 26, 17
(TISTM/BRW) OTS price $1.60

Bell Aerosystems Co., Buffalo, N. Y.
INORGANIC CHEMISTRY PROCESS IMPROVEMENT,
by Lincoln I. Foertter and Sam A. Long. 3 Apr 63, 9p. (Rept. no. BLR 62-21(C), Rev. A)
(Contract AF 33(657)8555)
Unclassified report

DESCRIPTORS: *Metals, *Nickel, Aluminum alloys, Metal coatings, Electrodeposition, Electrolytes, Metalorganic compounds, Mandrels, Electroforming, Electroplating.

Significant progress was made in the direct deposition of nickel on 6061 aluminum pretreated by two different methods. Barrett sulfamate nickel plating baths were put into operation for use in electroforming. The Dalic Plating Process was installed and plating techniques developed. (Author)

AD-401 855 Div. 26, 30
(TISTP/FEM) OTS price $2.60

Boeing Scientific Research Labs., Seattle, Wash.
COMPARISON OF REPLACEMENT POLICIES, AND RENEWAL THEORY IMPLICATIONS,
by Richard E. Barlow and Frank Proschan. Feb 63, 23p. 10 refs. (Rept. no. D1-82-0237)
Unclassified report

Also available from the author.

DESCRIPTORS: *Maintenance, *Reliability, Theory, Probability, Statistical distribution, Degradation, Inequalities, Functions, Scheduling, Aging (Materials).

AD-402 092 Div. 26
(TISTP/MB) OTS price $1.10

Carnegie Inst. of Tech., Graduate School of Industrial Administration, Pittsburgh, Pa.
SOLUTION OF A STOCKING PROBLEM BY A SHORTEST ROUTE ALGORITHM,
by Robert Connelly. 1 Mar 63, 5p. incl. illus. 5 refs. (ONR research memo. no. 108)
(Contract Nonr-76001, Proj. NR-047 011)
Unclassified report

DESCRIPTORS: *Industrial production, Quality control, Costs, Statistical analysis, Operations research.

AD-402 173 Div. 26, 17
(TISTM/BRW) OTS price $1.10

General Dynamics/Convair, San Diego, Calif.
SHEAR STRENGTHS OF RIVETS AT SUB-ZERO TEMPERATURES.
Report on Material - Titanium - Ti 13V-11Cr-3Al (B120VCA),
by H. Stier, P. W. Bergstedt, and H. C. Turner. 3 Nov 59, 3p. table (Rept. no. 8926-153)
(Contract AF 33(657)8926)
Unclassified report

DESCRIPTORS: *Rivets, Titanium alloys, Vanadium alloys, Chromium alloys, Aluminum alloys, Low temperature research, Shear stresses.

Annealed, 3/16-in. diam., flat head Ti 13V-11Cr-3Al rivets were driven into single lap joints of Ti 4Al-3Mo-1V, 0.063-in-thick sheet which were heat treated to 190 ksi ultimate tensile strength. Each joint contained two tandem rivets spaced 3/4 in. apart and held 3/8 in. from the edge of the joint. The yield and ultimate rivet loads are tabulated. (Author)

AD-402 306 Div. 26, 7, 5
(TISTE/CAM) OTS price $5.60

Burndy, Norwalk, Conn.
RESEARCH DESIGN AND DEVELOPMENT, TOOL AND SPLICE FOR TELEPHONE CABLE WF-16 ( )/(U).
Final rept., Mar 61-Jan 63,
by T. Pires and W. L. Colwell. Jan 63, 1v. incl. illus. tables.
(Contract DA 36-039-sc-87226)
Unclassified report

DESCRIPTORS: *Splicing tools, *Crimping tools, Design, Moistureproofing, Aluminum alloys, Weight, Mechanical properties, Dies, Operation, Test methods, Electric insulation, Telephone lines.

The design and development of a splice and crimping tool for telephone cable are presented. Prototype models of a splicing tool and sleeves were developed. Certain aspects of the tool and splice performance were evaluated which led to refinements. The areas of refinement centered around: (1) the terminated splice properties, both mechanical and electrical; (2) improvement of the guide mechanism which locates the prepared cable in the splice prior to crimping; and (3) the specifying of more suitable metal finish requirements, to be compatible with exposure, at extended periods to high humidity and salt spray conditions. The above-mentioned areas were covered and definite design changes instituted, such that the 4 tools and 3200 splices met the requirements. The crimp joint strength and moisture resistance characteristics were improved and found satisfactory; more applicable metal finishes were specified on critical components; the wire guides were redesigned and improved, thus facilitating the job of getting the WF-16 ( )/(U) cable properly inserted into the splicing sleeve. (Author)

AD-402 310 Div. 26
(TISTM/AW) OTS price $.75

Goodyear Aircraft Corp., Akron, Ohio.
STRUCTURAL FABRIC PROGRAM.
Interim technical progress rept., 1 Jan-31 Mar 63,
by J. O. Miller and E. Bilsky. 31 Mar 63, 19p. incl. illus.
(Contract AF 33(600)43036)
(ASD TR 7-904, vol. 7)
Unclassified report

DESCRIPTORS: *Metallic textiles, *Reentry vehicles, Stainless steel, Manufacturing methods, Storage, Material forming.

The purpose of this program, as related to aerospace application, is to provide a means of manufacturing large low-density AIRMAT structures made of metallic cloth and yarns capable of small volume packaging. During this period, the loom design was finalized and fabrication of the major portion of the loom parts and assemblies was completed. The design of the take-off mechanism

was completed and fabrication was under way. A site for the loom was selected and preparations are under way for loom installation. Efforts are directed toward the development of a loom procurement specification and the actual procurement of a loom capable of producing a low-density AIRMAT in the order of 20 feet wide with a maximum depth of 8 feet. (Author)

AD-402 406 Div. 26, 17
(TISTM/AMS) OTS price $1.60

Aeroprojects Inc., West Chester, Pa.
INVESTIGATION OF ULTRASONIC WELDING OF REFRACTORY METALS AND ALLOYS.
Bimonthly progress rept. no. 3, 16 Dec 62-15 Feb 63.
Mar 63, 6p. incl. illus. 5 refs.
(Contract NOw 63-0125-c)
Unclassified report

DESCRIPTORS: *Welding, *Heat resistant metals and alloys, Nickel alloys, Chromium alloys, Iron alloys, Control, Molybdenum alloys, Titanium alloys, Niobium alloys, Tungsten Ultrasonic radiation.

AD-402 425 Div. 26
(TISTM/AM) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
METHOD OF FORGING, EXTRUDING, BENDING AND OTHER DEFORMING OPERATIONS OF SHEETED PLASTIC MATERIALS,
by L. A. Yutkin and L. I. Gol'tsova. 12 Mar 63, 5p. incl. illus. (Trans. no. FTD-TT-62-1755 from Russian Patent Nr. 147162 (Appl. Nr. 622741/25, 23 Mar 59) pp. 1-3, 1962) Unclassified report

DESCRIPTORS: *Hydrostatic pressure, *Forging, *Extrusion, Materials, Sheets, Processing, Patents, Hydraulic presses, Deformation, Impact shock, Shock waves, Electric discharges, Liquids, Plastics.

Method of forging, extruding, bending and execution of other operations connected with the deformation of sheeted plastic materials is distinguished by the fact that the mentioned operations are realized under the effect of electro-hydraulic impacts (shocks) originating in an open or closed vessel, bottom, wall or lid of which is served by the machined materials. (Author)

AD-402 428 Div. 26
(TISTE/JWS) OTS price $1.10

Foreign Tech Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
FROM A PROGRAM MACHINE TO AN AUTOMATIC PLANT (SELECTED ARTICLE),
by M. A. Khabenskiy. 14 Mar 63, 5p. (Trans. no. FTD-TT-62-1758 from Russian Book, Programmoye Upravleniye Metallo-Rezhushchikh Stankov, Sverdlovsk, Mashgiz, pp. 34-37, 1962)
Unclassified report

DESCRIPTORS: *Industrial plants, Industrial production, Machine tools, Machine shop practice, Programming, Control systems, Digital computers, Automation.

AD-402 429 Div. 26
(TISTA/GEC) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
HYDRAULIC VOLUMETRIC PUMP,
by L. A. Yutkin and L. I. Gol'tseva. 13 Mar 63, 4p. incl. illus. (Trans. no. FTD-TT-62-1847 from Russian Patent 110887, (Appl. No. 550495, 17 Mar 1955), pp. 1-3, 1955)
Unclassified report

DESCRIPTORS: *Hydraulic pressure pumps, Electric dischargers, Design.

The invention described is a volumetric pump with a pressure chamber provided with two electrodes, used for creation of spark discharges, causing pressure pulses in the compressed liquid. (Author)

AD-402 443 Div. 26, 30
(TISTM/AMS) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PROGRAM CONTROL OF METAL CUTTING MACHINES (SELECTED ARTICLE),
by V. I. Kuznetsov. 12 Mar 63, 7p. (Trans. no. FTD-TT-62-1759 from Russian Book, Dostizheniya v Oblasti Tekhnicheskogo Progressa v SSSR, Proftekhizdat, pp. 152-157, 1961)
Unclassified report

DESCRIPTORS: *Machining, *Automation, Manufacturing methods, Industrial production, Processing, Industrial equipment, Programming, (Computers), Computers, Metals, Photoelectric effect, Magnetic tape, Punched tape.

AD-402 445 Div. 26, 27
(TISTP/RD) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PROBLEM NUMBER ONE - RELIABILITY,
by A. I. Berg. 18 Mar 63, 15p. (Trans. no. FTD-TT-63-40 from Russian Periodical, Tekhnika Molodezhi, No. 10, pp. 7-10, 1960)
Unclassified report

DESCRIPTORS: *Industrial production, *Quality control, *Reliability, Human engineering, Automation, Molecular electronics, Quality control, Industrial equipment.

AD-402 448 Div. 26
(TISTE/JWS) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
READJUSTABLE AUTOMATIC LINES FOR MODERNIZED MACHINES FOR THE PRODUCTION OF TAPS,
by D. G. Yakovlev and O. E. Nudel'man. 28 Mar 63, 6p. incl. illus. (Trans. no. FTD-TT-63-45 from Perenalazhivayemye Avtomaticheskiye Linii - Iz Modernizirannykh Universalnykh Stankov Dlya Izgotovleniya Metchikov, pp. 221-223, 1962)
Unclassified report

DESCRIPTORS: *Taps, *Machine tools, Milling machines, Machining, Grinders, Industrial production, Production, Manufacturing methods.

AD-402 449 Div. 26
(TISTM/BRW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CASTING IN VIBRATION MOLDS,
by V. A. Povidaylo, R. I. Silin, and V. A. Shchigel'. 1 Apr 63, 6p. incl. illus. (Trans. no. FTD-TT-63-46 from Russian Book, Vibratsionnyye Ustroystva v Mashinostroyenii, Moscow, 1962, pp. 89-94)
Unclassified report

DESCRIPTORS: *Material forming, *Casting, Alloys, Metals, Vibration.

AD-402 450 Div. 26, 4, 14
(TISTM/AMS) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ON THE FEASIBILITY OF THE ANODE-JET METHOD OF PROCESSING METALLIC SURFACES,
by S. A. Dovnar. 28 Mar 63, 5p. incl. illus. table, 2 refs. (Trans. no. FTD-TT-63-49 from Doklady Akademii Nauk BSSR, 6:8, pp. 494-496, 1962)
Unclassified report

DESCRIPTORS: *Electrolytic polishing, *Electroerosive machining, Jets, Abrasive blasting, Machining, Material removal, Abrasives, Films, Electrolytes, Manufacturing methods.

AD-402 451 Div. 26
(TISTM/BRW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
METHOD OF OBTAINING IMPACT DEFORMING FORCES BY MEANS OF ELECTROHYDRAULIC SHOCKS,
by L. A. Yutkin and L. I. Gol'tsova. 28 Mar 63, 4p. incl. illus. (Trans. no. FTD-TT-63-25 from Russian Patent Nr. 142502 (Appl. Nr. 419284/25, 24 May 1962), pp. 1-3, 1962)
Unclassified report

DESCRIPTORS: *Material forming, Electric discharges, Liquids, Shock waves, Impact shock.

AD-402 468 Div. 26, 17
(TISTM/AMS) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CERTAIN CHARACTERISTICS OF WELDING TITANIUM UNDER FLUX,
by S. M. Gurevich. 29 Mar 63, 17p. incl. illus. tables, 22 refs. (Trans. no. FTD-TT-63-22 from Russian Periodical, Avtomaticheskaya Svarka, No. 5, pp. 38-48, 1957)
Unclassified report

DESCRIPTORS: *Welding, Welding fluxes, Gases, Oxygen, Melting, Sodium compounds, Fluorides, Titanium.

AD-402 469 Div. 26, 25
(TISTP/PCR) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CHARGING SOLID PARTICLES AND DROPS IN AN ELECTRIC FIELD,
by Ye. V. Moiseyev. 14 Mar 63, 8p. incl. illus. 4 refs. (Trans. no. FTD-TT-62 1830 from Russian periodical, Referativnyy zhurnal. Khimiya. no. 15, pp. 55-57, 1961)
Unclassified report

DESCRIPTORS: *Charged particles, *Electric fields, *Paint applicators, Coatings, Equations, Theory, Drops, Automatic

The electrical charge of solid particles or drops of paint in contact charging is achieved as a result of raising the voltage of the power source, of using material with high electrical conductance, of sharp rounding of the atomizer, and of decreasing the thickness of the layer of material on the edge of the electrode. Since certain variables simultaneously influence the size of the charge it is necessary strictly to maintain the technological regime according to the voltage, paint flow rate, and electrical parameters of the material. (Author)

27. PROPULSION SYSTEMS

AD-401 244 Div. 27, 14
(TISTM/BRW) OTS price $2.60

Calorobic Materials Inc., Pearl River, N. Y.
DEVELOPMENT AND UTILIZATION OF OPTIMUM TECHNIQUES FOR THE FABRICATION OF TITANIUM BORONITRIDE ROCKET NOZZLES.
Quarterly rept. no. 2,
by R. Strickman, and J. Donnellon. Jan 63, 10p. incl. illus. tables. (Technical rept. TR 371.9/5) (Contract DA-30-069-ORD-3747, Proj. no. 59332008)
Unclassified report

DESCRIPTORS: *Rocket motor nozzles, *Refractory materials, Titanium compounds, Boron compounds, Nitrides, Borides, Machining, Manufacturing methods, Hot working, Hydraulic presses, Sintering, Powder metals, Non-destructive testing, Ultrasonic radiation, Materials, Material forming.

The need for rigorous control on the raw materials used in subsequent processing steps was found to be required. In the fabrication of various specimens to final dimensions of compositions A and B, identical tooling and cutting speeds and feeds were used. The scalping operation of the product bar was optimized by the newly developed diamond wheel turning technique. X-ray non-destructive inspection procedures and norms for both material compositions were established. Tooling for the HTB-3 rocket nozzle insert compacts was completed and tested. (Author)

AD-401 467 Div. 27, 9
(TISTA/VGW) OTS price $2.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
UNSTEADY STALL OF AXIAL FLOW COMPRESSORS.
Quarterly progress rept. no. 1,
by W. G. Brady. Mar 63, 24p. incl. illus. 4 refs.
(CAL rept. no. AM-1762-A-1)
(Contract DA-49-186-AM-13(X))
Unclassified report

DESCRIPTORS: *Axial flow compressors, Wind tunnel models, Model tests, Laminar boundary layer, Separation, Stalling, Vortices, Perturbation theory, Shroud rings, Pressure, Turbulence.

Division 27 - PROPULSION SYSTEMS

A research program is reported of rotating stall and other unsteady surge characteristics of axial compressors. Included in this effort will be studies of the aerodynamics of compressor stages, studies of unsteady sectional-lift characteristics of single-blade elements near stall, and studies of possible methods of alleviating unsteady surge characteristics. In the current year's effort, the initial emphasis is on the continuation of two studies started under the original program: (1) a theoretical study of the role of entering swirl pattern in causing rotating stall of a single stage, and (2) an experimental study of the separation criteria for a moving surface (shrouded rotating cylinder). (Author)

AD-401 587 Div. 27, 1
(TISTA/FRL) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ON THE PROBLEM OF SYNTHESIZING BLOCK DIAGRAMS FOR SELF-ADJUSTING CONTROL SYSTEMS FOR TURBO-JET ENGINES WITH AFTERBURNERS,
by V. A. Bodner and Yu. A. Ryazanov. 26 Feb 63. 23p. incl. illus. tables (Trans. no. FTD-TT-62-1655 from Russian Book, Avtomaticheskeye Regulirovaniye Aviadvigateley, sbornik statey, Oborongiz, Moskva, No. 3, pp. 33-50, 1961)
Unclassified report

DESCRIPTORS: *Turbojet engines, Circuits, Afterburners, Control systems.

The problems of synthesizing block diagrams of self-adjusting control systems for turbojet engines with afterburners, which ensure optimalization of the transients in the control circuits for the speed of revolution and gas temperature, are presented. The specific natures of the variation in the dynamic parameters of the engine and parameters of the controllers under different flight conditions are taken into account. (Author)

AD-401 741 Div. 27, 25, 10
(TISTM/PCR) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
TRANSIENTS IN THE BURNING OF POWDERS,
by B. V. Novozhilov. 15 Mar 63, 13p. incl. illus. 1 ref. (Trans. no. FTD-TT-63-112 from Russian Periodical, Zhurnal Prikladnoy Mekhaniki i Tekhnicheskoy Fiziki, no. 5, pp. 83-88, 1962)
Unclassified report

DESCRIPTORS: *Explosive materials, *Combustion, *Rocket motors (Solid propellant), Velocity, Pressure, Temperature, Mathematical analysis, Equations, Solid rocket propellants, Combustion products, Rocket motor nozzles.

The simplest nonsteady-state processes during the transition of the burning of powder from one steady-state regime to another are examined. By numerically solving equations, the time-dependences of the burning velocity, pressures in the chamber, and temperature profiles in the solid phase are determined. (Author)

AD-402 093 Div. 27, 12
(TISTA/FRL) OTS price $2.60

Ogden Air Material Area, Hill Air Force Base, Utah.
REMOVAL AND REPLACEMENT PROCEDURE FOR NOZZLE CLOSURE, IM99B BOOST MOTOR,
by Don F. Woods. Apr 63, 21p. incl. illus. (Rept. no. OOY-TR-63-8)
Unclassified report

DESCRIPTORS: *Rocket closure cups, *Rocket motor nozzles, Booster rockets, Rocket motors (Solid propellant), Sealing compounds, Guided missiles (Surface-to-air), Maintenance, Seals.

The nozzle opening of the IM99B Boost Motor (M51 Rocket Motor) is sealed by a polyurethane foam closure bonded to the nozzle expansion cone. Occasionally the closure is damaged and must be removed and replaced. The removal procedure consists of very carefully chiseling away the polyurethane foam until the bonding material is exposed. The bonding material (polysulfide sealing compound) is then removed by peeling back with the fingers and by sanding. The closure is replaced by applying a commercial sealing compound to the closure and nozzle expansion cone, inserting the closure into the cone and allowing the sealing compound to cure. Field or depot removal and replacement of damaged closures are practical. No special tools or equipment is required. Necessary material and parts are available through normal supply channels. (Author)

AD-402 393 Div. 27, 30
(TISTA/GEC) OTS price $12.00

United Technology Corp., Sunnyvale, Calif.
DEVELOPMENT OF NONDESTRUCTIVE TESTING TECHNIQUES FOR LARGE SOLID-PROPELLANT ROCKET MOTORS.
Final rept., 1 June 62-31 Jan 63,
by Charles Harris. 17 Apr 63, 160p. incl. illus. tables, 11 refs. (Rept. no. UTC 2015-FR)
(Contract AF 04(611)8018)
Unclassified report

DESCRIPTORS: *Rocket motors (Solid propellant), Test methods, Ultrasonic radiation, Radiography, Effectiveness, Thermal insulation, Rocket cases, Bonding, Combustion chamber liners, Configuration, Non-destructive testing.

A study was made to determine the capabilities of nondestructive test methods best suited to the detection of critical defects in large solid-propellant motors. A critical defect may be defined as an imperfection in a motor which will impair the success of an assigned mission. Two general types of defects are classified as critical regardless of their size. These are a case-insulation unbond exposed to propellant gases, and any defect which tends to propagate without limit. Analytical studies suggested that certain configurations of propellant-liner unbonds and cracks may propagate. Experimental studies conducted with a PBAN propellant showed no evidence of defect propagation. (Author)

AD-402 473 Div. 27
(TISTM/RD) OTS price $4.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
NEWS OF THE HIGHER INSTITUTIONS OF LEARNING. MACHINE CONSTRUCTION. (SELECTED ARTICLES).
19 Mar 63, 40p. incl. illus. refs. (Trans no. FTD-TT-63-33 from Izvestiya vysshikh uchebnykh zavedeniy, Mashinostroyeniye, No. 2, pp. 19-30, 66-77, 1960)
Unclassified report

DESCRIPTORS: *Turbines, *Gas turbines, *Axial-flow compressors, Compressor blades, Flutter, Cooling, Aerodynamic characteristics.

28. PSYCHOLOGY AND HUMAN ENGINEERING

AD-401 025 Div. 28 .
(TISTB/AW) OTS price $15.50

Illinois U., Urbana.
THE MEASUREMENT OF INDIVIDUAL DIFFERENCES IN PERCEIVED PERSONALITY TRAIT RELATIONSHIPS AND THEIR RELATION TO CERTAIN DETERMINANTS.
Doctoral thesis,
by Darhl M. Pedersen. Sep 62, 222p. incl. illus. tables, 146 refs.
(Contract Nonr 183439)
Unclassified report

DESCRIPTORS: *Personality, *Perception, Correlation techniques, Theory, Psychometrics, Factor analysis, Identification.

This study was directed toward investigated individual differences in perceived personality trait relationships, the personality, ability, and sociological correlates or determinants of the different points of view held by the different types of individuals discovered, and the structure of trait relationships for the different points of view. Three significant dimensions were obtained for each of four analyses. The meaning of the three composite dimensions or points of view resulted from a consideration of the determinants of the three points of view, and the item coefficients for each of the three points of view. The results indicated that the major component in the trait similarity ratings was the second point of view which represented a kind of 'conventional' view of trait relationships. (Author)

AD-401 144 Div. 28
(TISTB/AW) OTS price $9.60

Washington U., St. Louis, Mo.
THE MEASUREMENT AND EVALUATION OF OVER- AND UNDERACHIEVEMENT.
Proceedings of a Conference on Research Methodology in Training,
by Philip H. DuBois and Edward V. Hackett.
Apr 63, 11p. incl. tables, 100 refs. (Technical rept. no. 8)
(Contract Nonr 816(02))
Unclassified report

DESCRIPTORS: *Symposia, *Psychometrics, *Achievement tests, Personality, Motivation, Learning, Students, Sociology, Culture, Bibliographies, Training, Education.

AD-401 290 Div. 28
(TISTB/AW) OTS price $1.60

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
BEHAVIORISTIC OR NORMATIVE DECISION CRITERIA,
by Martin Shubik. 19 Mar 63, 18p. incl. illus. 13 refs. (Research paper RC-902)
(Contract Nonr 377500, Proj. NR 047040)
Unclassified report

DESCRIPTORS: *Decision making, Economics, Behavior, Theory, Game theory, Analysis, Synthesis, Models (Simulations).

Different models of decision making processes are discussed and contrasted. It is pointed out the difference between certain 'rationalistic' models and heuristic decision rules is more a matter of the scope of the process being modeled than a basic difference in approach. (Author)

AD-401 291 Div. 28
(TISTB/AW) OTS price $1.10

Illinois U., Urbana.
STUDIES OF CONCEPT INVENTION.
Final rept.,
by Lee J. Cronbach. 1 Apr 63, 9p.
(Contract Nonr 183433)
Unclassified report

DESCRIPTORS: *Perception, *Learning, Theory, Test methods, Synthesis.

This study of concept formation investigated the following hypothesis: when a person encounters a series of objects of a certain type and observes certain associated properties or consequences, he will come to rely on certain aspects of the object as predictors. Ultimately, he will develop a theory about the class of objects, so that from its characteristics he can predict which of the possible consequences will occur, i.e., he will infer the properties of the object from selected data. While this process is frequently perceptural and unverbalized, with continued experience a person should be able to develop explicityly formulated rules for the predictions. A key step in this hypothesized process is identification of dimensions or constructs, i.e., the structuring of the stimulus set. The hypotheris was that the person invents dimensions for thinking about unfamiliar stimuli objects or, more specifically, that from the indefinitely large number of partly redundant attributes that could be used to describe differences among the stimuli, he selects certain ones that he often finds relevant to criteria, and thereafter uses these attributes as a framework in establishing predictive laws even for new criteria. The long-range program was to study the process by which, through a series of concept-formation tasks involving the same stimulus-family, the person develops a conceptual structure regarding that family. (Author)

AD-401 393 Div. 28, 1
(TISTP/FEM) OTS price $2.60

RAND Corp., Santa Monica, Calif.
INSTRUMENTAL VARIABLES IN FACTOR ANALYSIS,
by Albert Madansky. Apr 63, 16p. 20 refs.
(Rept. no. RM-3591-PR)
(Contract AF 49(638)700)
Unclassified report

DESCRIPTORS: *Factor analysis, *Psychometrics, Sampling, Errors, Matrix algebra, Real variables, Statistical tests.

The factor-analysis model is rewritten as a system of linear structural relations with errors in variables. The method of instrumental variables is applied to this revised form of the model to obtain estimates of the factory loading matrix. The relation between this method and interbattery analysis, proportional profile analysis, and canonical factor-analysis is pointed out. In addition, an estimation procedure based on replicated sampling different from proportional profile analysis is given. (Author)

AD-401 405 Div. 28
(TISTB/AW) OTS price $1.10

6570th Personnel Research Lab. Aerospace Medical Div., Lackland Air Force Base, Tex.
CHANCE DISTRIBUTION OF INCONSISTENT RESPONSE PATTERNS IN PAIRED COMPARISON AND MULTIPLE RANKING DESIGNS
by Charles E. Zimmer. Jan 63, 5p. incl. illus. table, 4 refs. (Rept. no. PRL-TDR-63-1)
(Proj. 7719)
Unclassified report

DESCRIPTORS: *Psychometrics, *Correlation techniques, Statistical distributions, Psychology.

Comparative judgments are used in developing scales for various personnel and occupational criteria. In scaling data from paired comparisons, frequency of inconsistent responses is crucial. To determine whether information from the simpler and more economical multiple ranking design can be evaluated by the same techniques as for a complete paired comparison design, computer programs were adapted whereby the full population of possible response patterns could be randomly sampled to determine the chance distribution of inconsistent responses for both designs. Results for the 1000 randomly selected patterns showed that the multiple rank order design restricts the possible number of response patterns and reduces the frequency of inconsistent patterns. The distributions were so different that techniques devised for testing significance of extreme frequencies for data from the classic paired comparison design are inappropriate for evaluating extreme occurrences in multiple ranking data. Since the multiple ranking distribution approximates the normal distribution, it would be suitable to evaluate empirical data by comparison with the parameters here determined for the random sample of the full population of response patterns. (Author)

AD-401 480 Div. 28
(TISTB/AW) OTS price $1.60

Bureau of Naval Personnel, Washington, D. C.
DEVELOPMENT AND STANDARDIZATION OF FORM 6 OF THE U. S. NAVY LITERACY TEST,
by Leonard Swanson. Aug 62, 11p. incl. tables, 4 refs. (Technical bulletin 62-15)
Unclassified report

DESCRIPTORS: *Aptitude tests, Standardization, Identification, Recruiting, Reading, Test construction (Psychology), Naval personnel.

A new form of the Literacy Test to replace the Literacy Test, Form X-1, (LIT X-1) was developed and standardized. Since World War II, LIT X-1 has been used operationally as an aid in identifying Navy recruits with abilities too limited for retention in the Navy. The new Literacy Test, Form 6, is a significant improvement over Form X-1 in terms of its difficulty level and discriminating power as well as in terms of its correlations with other tests of reading ability. A new format incorporating reusable booklets and separate answer sheets was designed which will provide economy in maintaining test inventories and in scoring. The Literacy Test, Form 6, was recommended for early operational use. The correlation between LIT 6 and the Stanford Reading Test (average r = .76) is significantly higher than that between LIT X-1 and the Stanford Reading Test (average r = .45); therefore, LIT 6 can be considered a more satisfactory measure of reading achievement than Form X-1. The standard deviation has been increased from about 3.3 in LIT X-1 to about 5.5 in LIT 6. The items in LIT 6 are of a more appropriate difficulty level than those in LIT X-1 for use with recruits with GCT below a Navy standard score of 36, the average difficulty values being .68 and .93, respectively. The internal consistency estimates of reliability appear to be satisfactory for LIT 6. Savings in scoring time and in material will be effected through the replacement of LIT X-1 by LIT 6. (Author)

AD-401 654 Div. 28
(TISTB/AW) OTS price $4.60

Airborne Instruments Lab., Inc., Deer Park, N. Y.
FORM PERCEPTION IN VIDEO VIEWING: EFFECTS OF RESOLUTION DEGRADATION AND STEREO ON FORM THRESHOLDS.
Rept. on Information Transmission for Decision, by Norman E. Freeberg. Dec 62, 42p. incl. illus. 19 refs.
(Contract AF 19(628)328, Proj. 9674)
(ESD-TDR-63-136) Unclassified report

DESCRIPTORS: *Television display systems, *Vision, *Intelligibility, Images, Distortion, Stereoscopic display systems, Thresholds (Physiology), Degradation, Test methods, Resolution.

Thresholds for video viewing of randomly constructed forms are determined under conditions of pictorial degradation and stereoscopic presentation. Form recognition is not significantly enhanced by stereo viewing but discrimination threshold is reduced. All form thresholds are highly sensitive to video image degradation. Video acuity is not significantly related to video form thresholds and can be affected by orientation of a pattern in relation to video scan lines. (Author)

AD-401 667 Div. 28
(TISTB/AW) OTS price $5.00

Institute for Psychological Research, Tufts U., Medford, Mass.
HUMAN ENGINEERING BIBLIOGRAPHY.
Oct 62, 343p. (ONR rept. no. ACR-75)
(Contract Nonr-49413)
Unclassified report

DESCRIPTORS: *Human engineering, *Bibliographies.

Contents:
Human engineering: methods, facilities, equipment, and general references
Systems of men and machines
Visual inputs and processes
Auditory input and processes, including speech production and intelligibility
Other sensory inputs and processes
Input channels: choice and interaction
Body measurements, basic physiological limits in motor performance, basic motor capacities, and perceptual motor skills
Design of controls and integration with displays
Layout of panels and consoles
Design of work space, equipment, and furniture
Clothing and personal equipment
Special environmental factors affecting performance
Other individual factors, work conditions, and task characteristics that affect behavioral efficiency
Training aids and devices and their use
Other areas of psychological research pertinent to human engineering

AD-401 677 Div. 28
(TISTB/AW) OTS price $3.60

Human Factors Research Inc., Los Angeles, Calif.
A STUDY OF FACTORS INFLUENCING THE JUDGMENT OF HUMAN PERFORMANCE.
Technical rept. no. 3 on The Influence of Unusual Performances and Time-order on Performance Judgment,
by James J. McGrath. Apr 63, 25p. incl. illus. tables, 4 refs.
(Contract Nonr 1241(00), Proj. NR 153-165)
Unclassified report

DESCRIPTORS: *Psychometrics, *Test construction (Psychology), Classification, Distribution, Decision making.

The effects of the occurrence of an unusual performance and of time-order on the judgment of a sequence of performance were studied. Silent, color movies were made of six male operators performing a simple reaction-time task. The operators had been thoroughly practiced until they could deliberately manipulate their mean reaction times (MRT). Three operators were used as ''anchoring performers'' to illustrate the top, bottom, and middle performance levels of a rating scale. The other three, operators A, B, and C, each performed five 1-minute trials. Six groups of raters (total N = 239) viewed the movie. They saw the three anchoring performers, then separately rated A, B, and C on their overall performance. It was concluded that first impressions of a worker being rated (and in some instances last impressions) can significantly bias a performance judgment and produce invalid ratings. (Author)

AD-401 696 Div. 28
(TISTB/AW) OTS price $2.60

Arizona State U., Tempe.
REINFORCEMENT VARIABLES IN THE CONTROL OF UNIT TEXTUAL RESPONSES,
by Arthur W. Staats, Judson R. Finley and others. Mar 63, 13p. illus. refs. (Technical rept. no. 23)
(Contract Nonr-279402)
Unclassified report

DESCRIPTORS: *Reading, *Verbal behavior, *Conditioned response, *Learning, Students, Children, Vocabulary, Attention, Instrumentation.

Work was begun on the development of an experimental procedure, recording apparatus, and a system of reinforcement with which to study the acquisition of textual behavior. Using these developments a study was conducted in which three 4-year-old children were run in 20-minute training sessions. The children continued the training until E suspended the experiment and in two cases the training extended for 40 sessions with the behavior remaining in good strength to the end. The results suggested that the procedure and recording technique could produce sensitive records of the conditioning of textual responses and that the reinforcemen system was capable of maintaining work and attentional behaviors over long periods of time. The present study investigates the value of the materials, apparatus, and general procedure for producing reliable results relating independent variables to the dependent variable of reading acquisitions, i.e., the effect upon reading rate of the manipulation of various reinforcement schedules, using multiple schedule techniques. In addition to validating the extension of certain behavior principles to this complex type of human learning, the experiment tests variables and procedures important to the further study of reading (and other types of child learning) and to the construction of an effective reading program. (Author)

AD-401 700 Div. 28
(TISTB/AW) OTS price $2.60

Tracor Inc., Austin, Tex.
THE DESIGN OF A PSYCHOPHYSICAL EXPERIMENT AND THE DEVELOPMENT OF THE EXPERIMENTAL MATERIALS TO ASSESS THE SCENICS DISPLAY.
Final rept.,
by Bruce H. Deatherage. 8 Jan 63, 16p. illus. table.
(Contract NObsr-85185)
Unclassified report

DESCRIPTORS: *Human engineering, *Stereoscopic display systems, Signal-to-noise ratio, Sonar personnel, Time, Space perception, Classification, Identification systems, Visibility, Sonar equipment.

A psychophysical experiment was designed to assess the advantage of the Scenics display over conventional two-dimensional displays. An a priori method for assessing the relative merits of two-dimensional displays and the three-dimensional Scenics display is discussed, along with the physical fact (binocular parallax) that underlies the Scenics method. Next, an empirical (psychophysical experimental) method and its rationale is explained, and the methods and pitfalls of analyzing the experimental data are discussed. It is recommended that the outcome of the work and analysis reported be: (1) the carrying out of the psychophysical experiment as described, and (2) the search for and study of methods to apply the expected measured advantages of the Scenics display to various detection equipments. (Author)

AD-401 878 Div. 28
(TISTB/AW) OTS price $1.60

Institute of Science and Tech. U., of Michigan, Ann Arbor.
RESPONSE BIAS EXPLANATION OF WORD-FREQUENCY EFFECT,
by Daniel H. Carson. Apr 63, 7p. incl. illus. tables, 2 refs. (Rept. no. 2900-374-R)
(Contract DA 36-039-sc-78801)
Unclassified report

DESCRIPTORS: *Perception, *Intelligibility, Vision, Reading, Vocabulary, Mathematical prediction, Test methods, Distortion, Identification.

The word-frequency effect observes that, when presented in equally noisy conditions, words occurring more frequently in the language are identified correcly more often than words occurring less frequently. The response bias explanation avers that this finding is due solely to the tendency to respond more frequently with the common, or more frequent, words. In a test of this explanation of word-frequency effect, printed five-letter words with letter deletions simulating different noisy conditions were used. The results show that a response bias model denyng stimuli any role accounts for practically all of the variance in the word-frequency effect at high noise levels. The model, however, is internally restricted, and its efficiency is artifactual. Another formulation, based on the Brown and Rubenstein model, will be tested in a future experiment. This new formulation is multiplicative instead of additive, and is no longer internally restricted. (Author)

AD-402 132 Div. 28
(TISTB/AW) OTS price $3.60

National Training Labs., Washington, D. C.
FACTORS PRODUCING DEFENSIVE BEHAVIOR WITHIN GROUPS.
Final technical rept., 1 Feb 60-31 Dec 62,
by Jack R. Gibb. 31 Dec 62, 29p. incl. tables, 56 refs.
(Contract Nonr-308800)
Unclassified report

DESCRIPTORS: *Group dynamics, *Behavior, Children, Industrial psychology, Education, Theory.

Empirical research and theory produced on a nine-year program designed to investigate the factors producing defensive behavior within groups is summarized. The structure and assumptions of a comprehensive defense-reductive theory of social behavior are briefly described, and related to the empirical research performed under three contracts. A summary is given of instances of practical tests of the theory in industrial, community, and educational settings. The research program is viewed in part as a test of a tri-partite theory of research technology. (Author)

AD-402 138 Div. 28
(TISTB/AW) OTS price $6.60

Kansas U., Lawrence.
A CONCEPTUAL AND MEASUREMENT MODEL FOR NORMS AND ROLES.
Research rept. on Comparative Studies of Mental Hospital Organization, The University of Kansas, by Jay Jackson. Feb 63, 60p. incl. illus. 57 refs.
(Grants OM-306 and OM-307)
Unclassified report

DESCRIPTORS: *Group dynamics, *Psychology, Statistical distributions, Behavior, Personality, Culture, Sociology, Adjustment psychology), Models (Simulations), Theory.

Role theory has been developing at two levels, in connection with two separate problem areas, socialization and the development of the self, and the organization of systems of action, or social systems. This research is concerned almost entirely with the second of these problems, although it may have some implications for the first one. In the process of attempting to conceptualize and to measure norms and roles in a number of field studies over the past ten years, a way of thinking systematically about these elusive concepts and a method of obtaining data that follows from this approach have emerged, called the Return Potential Model. Problems of definition in role theory and the possibilities of having a real theory are discussed. A model is described and some examples of measurement operations are provided to illustrate its use in research. The assumptions adopted in the formulation of this approach are then explored in relation to a number of existing generalizations in role theory. Some selected problems of role theory in the broader context of social psychology are discussed, as they have been investigated using the model, or as they might be pursued with it. (Author)

AD-402 146 Div. 28
(TISTB/AW) OTS price $4.60

Hawaii U., Honolulu.
AGE- AND SEX-DIFFERENCES IN THE FORMATION OF COALITIONS,
by W. Edgar Vinacke and Gary R. Gullickson.
11 Mr 63, 42p. incl. tables, 22 refs. (Technical rept. no. 3)
(Contract Nonr-374802, Proj. NR 170-270)
Unclassified report

DESCRIPTORS: *Group dynamics, Aging (Physiology), Sex, Children.

A simple competitive board game was used to determine changes in strategy as a function of age. Data were collected from 10 triads of each sex at the 7-8 and 14-16 year age-levels, and compared with results previously obtained from 30 groups of each sex at the college level. Inter-sex and inter-age comparisons were made of the kinds of outcome reached, incidence of 50/50 deals, the relation of bargaining and outcome to relative strength of players, amount of bargaining, and overall strategy (employing a special index to accommodative strategy). It was found that the female groups differ little from age-to-age, consistently displaying a high degree of accommodative strategy. By contrast, the youngest male groups manifest significantly more accommodative strategy than do older male groups. There is, thus, evidence of a developmental change in competitive behavior among males. (Author)

AD-402 216 Div. 28
(TISTP/RD) OTS price $1.60

Stanford Research Inst., Menlo Park, Calif.
ON CONVERGENCE PROOFS FOR PERCEPTRONS.
Technical rept.,
by Albert B. J. Novikoff. Jan 63, 12p. 11 refs.
(Contract Nonr-343800)
Unclassified report

DESCRIPTORS: *Artificial intelligence, *Pattern recognition, Geometry, Vector analysis, Simulation.

The purpose of this research is to exhibit an extremely short and, more notably, transparent proof of a theorem concerning perceptrons. The theorem itself must now be considered one of the most basic theorems about perceptrons, and indeed, is among the first theorems proved by Rosenblatt and his collaborators. We present our proof in its entirety, in part to verify our claim that it is as short a line as can be drawn from hypotheses to conclusion, and also with the hope of terminating an already lengthy process of successive refinements. In addition, we prove a related theorem which is the continuous analogue of the perceptron theorem, and we indicate that various other theorems may be obtained by appropriately modifying the hypotheses. We also discuss a geometrical interpretation of the perceptron theorem in terms of a convex cone and its dual. (Author)

AD-402 386 Div. 28, 23
(TISTB/AW) OTS price $1.60

Behavioral Sciences Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
A BIBLIOGRAPHY OF REPORTS ISSUED BY THE BEHAVIORAL SCIENCES LABORATORY: ENGINEERING PSYCHOLOGY, TRAINING PSYCHOLOGY, ENVIRONMENTAL STRESS, SIMULATION TECHNIQUES, AND PHYSICAL ANTHROPOLOGY - 1946-1962,
comp. by L. Jean Thomas. Mar 63, 109p.
Unclassified report

DESCRIPTORS: *Human engineering, *Training, *Control systems, *Display systems, Anthropometry, Simulation, Maintenance, Training devices, Stress (Psychology), Tracking, Weightlessness, Design, Models (Simulations), Bibliographies, Military requirements.

29. QUARTERMASTER EQUIPMENT AND SUPPLIES

AD-401 212 Div. 29
(TISTB/AW) OTS price $5.60

Human Engineering Lab., Aberdeen Proving Ground, Md.
EFFECTIVENESS OF THE V-51R EAR PLUG WITH IMPULSE PRESSURES UP TO 8 PSI,
by Bernard Jacobson, Elizabeth M. Dyer, and Robert J. Marone. Nov 62, 52p. incl. illus. tables, 13 refs. (Technical memo. 1-63)
Unclassified report

DESCRIPTORS: *Ear, Noise, Weapons, Military requirements, Effectiveness, Blast, Military personnel, Safety devices.

The protection which the V-51R Ear Plug provides against high-intensity impulse noise was determined for simulated rapid-fire field conditions. Twenty enlisted men were exposed to 2, 4, and 6 lb/sq. in. peak overpressures generated by a 105mm howitzer. Their temporary threshold shifts were then measured at 2000 and 4000 cps. The results indicated that inserting the V-51R Ear Plug without checking its fit does not give adequate protection to all personnel. It was also found that a protection-checked ear (ear plug inserted to minimize the level of a reference sound) gave adequate protection with impulse pressures up to 8 psi. (Author)

AD-401 287 Div. 29
(TISTW/JEA) OTS price $1.10

Meiner, Vincent, Port Washington, N. Y.
DESICCATING BARRIERS FOR MILITARY PACKAGING.
Technical rept. no. 1, 1 Nov 62-1Feb 63.
1 Feb 63, 6p. incl. illus.
(Contract NOw 63-0155-c)
Unclassified report

DESCRIPTORS: *Containers, *Bags (Containers), Moisture, Controlled atmosphere, Humidity, Costs, Packing materials, Plastics, Military requirements, Reliability.

Research is concerned with the development of new and superior packaging systems and materials capable of producing a dehumidified or moisture-controlled atmosphere, at a lower cost and with a greater degree of efficiency. The work to date has consisted mainly of an attempt to correlate the results of research of the literature with research in the laboratory, and preliminary laboratory investigations of the more promising avenues of development. (Author)

AD-401 779 Div. 29
(TISTM/CCH) OTS price $2.60

Aerospace Information Div., Washington, D. C.
SOVIET LITERATURE ON PROTECTIVE STRUCTURES AND COMPONENTS.
20 Mar 63, 20p. incl. illus. table, 14 refs.
(AID rept. no. P-63-38)
Unclassified report

DESCRIPTORS: *Protective coverings, *Reviews, *Structures, *Ground support equipment, Construction, Handling, Launching sites, Preservation, Storage, Containers, Maintenance, Guided missile personnel, Design.

AD-401 819 Div. 29
(TISTM/CCH) OTS price $2.60

Army Combat Developments Command, Fort Belvoir, Va.
SMALL DEVELOPMENT REQUIREMENT FOR INDIVIDUAL AID AND SURVIVAL KIT FOR SPECIAL WARFARE.
1963, 1v. incl. illus.
Unclassified report

DESCRIPTORS: *Survival kits, Operation, Operations research, Guerrilla warfare, Personnel, Design.

Purpose of this research is to provide minimum essential self-aid and survival articles for a period of up to ten days, when supplemented with foraged foods, for personnel in an evadee status and study their operational characteristics. (Author)

30. RESEARCH AND RESEARCH EQUIPMENT

AD-401 028 Div. 30
(TISTP/FR) OTS price $6.60

United Aircraft Corp., East Hartford, Conn.
CATEGORY II TEST REPORT FOR WIND MEASURING SET AN/TMQ-15.
March 28, 1962. 1v. incl. illus. table, 5 refs.
(Rept. no. WSC E-29)
(Contract AF 19(626)16)
(ESD TDR 63-303) Unclassified report

DESCRIPTORS: *Anemometers, *Wind direction indicators, Tests.

A test program was conducted on Wind Measuring Set AN/TMQ-15. The program was conducted to meet the objectives of testing as defined in AFR 80-14, and specifically to determine the suitability of the AN/TMQ-15 as a tactical wind measuring set. The test program was conducted separately at two test sites to provide broader coverage of testing. The conclusion is reached from the test results, that in its present configuration, the AN/TMQ-15 is not suitable for use as a tactical wind measuring set. Recommendations for engineering modifications to provide the ruggedness and flexibility required of tactical equipment are included which, when incorporated, will result in a suitable item (Author)

AD-401 052 Div. 30, 14
(TISTM/ODN) OTS price $9.60

Southwest Research Inst., San Antonio, Tex.
LOX-LUBRICANT IMPACT SENSITIVITY RESULTS FOR ASD COOPERATIVE TEST PROGRAM NO. 3.
Special rept., Nov 60-Dec 62,
by B. B. Baber and F. Chang. 25 Jan 63, 60p. incl. illus. tables, 4 refs. (Rept. no. RS-369)
(Contract AF 33(616)7223, Proj. 3044)
Unclassified report

DESCRIPTORS: *Liquefied gases, *Oxygen, *Lubricants, Test equipment, Test methods, Impact shock, Tests, Compatibility, Specifications, Halocarbon plastics, Cryogenics, Sensitivity.

The results from LOX-Lubricant Impact Sensitivity Cooperative Program No. 3 are presented. Impact

sensitivity threshold values of three test samples were evaluated by ten laboratories. Seven laboratories reported results using the ABMA type impact tester and three laboratories reported results using the RMD impact tester. Even though rather large variations in specific threshold values were reported by laboratories using the ABMA type impact tester, there was general agreement between laboratories with respect to the relative sensitivity of the three test samples evaluated. General agreement of relative sample sensitivity was also obtained by laboratories using the RMD impact tester; however, the order of sample sensitivity was different from that obtained with the ABMA type impact tester. Although the LOX-Lubricant Impact Sensitivity Cooperative Program No. 3 showed definite improvements in test reproducibility from the previous cooperative test programs, further improvement in test reproducibility still appears desirable. (Author)

AD-401 135 Div. 30
(TISTP/FR) OTS price $1.10

Marine Physical Lab., U. of Calif, San Diego.
DIGITAL ENCODER AND PAPER TAPE PUNCH,
by Earl D. Squier. 1 Feb 63, 7p. incl. illus.
(Rept. no. MPL-U-25/62; SIO reference 63-1)
(Contract Nonr 2216(05))
Unclassified report

DESCRIPTORS: *Digital recording systems, Electronic scanners, Analog-to-digital converters, Punched tape.

An all-solid-state digital recording system is described along with an example of its operation. The equipment consists of a 200-channel input scan switch, an analog-to-digital converter, and a paper tape punch. Input voltages are encoded into 4-, 8-, or 12-bit words and punched on paper tape as 4-bit characters at rates up to 50 characters per second. Provisions are included for formatting the tape for use in the Bendix G15 computer. (Author)

AD-401 142 Div. 30, 9
(TISTP/JP) OTS price $8.10

General Electric Co., Schenectady, N. Y.
MOLECULAR FLUX DISTRIBUTION IN AN AEROSPACE CHAMBER - ANALYSIS OF GAS KINETICS.
Summary rept.,
by C. A. Tsonis. Apr 63, 81p. incl. illus.
(Contract AF 40(600)954)
(AEDC-TDR-63-88) Unclassified report

DESCRIPTORS: *Space environmental conditions, *Superaerodynamics, *Transport properties, Solar wind, Spacecraft, Simulation, Molecules, Diffusion, Simulation.

The molecular incidence rates on the various surfaces of the space simulator are determined analytically. The mathematical model of the space simulator consists of two concentrically located sperical surfaces corresponding to the chamber wall outside and to the vehicle inside. The analysis is divided into two phases. Phase I deals with conditions of uniform pumping and outgassing on each surface. A square pulse of outgassing is assumed to occur and the total number of molecular incidence rates are obtained. Phase II is an analysis of the nonuniform case introduced by surface discontinuities of axiosymmetric type. The procedure followed is to determine the various probabilities that a molecule leaving a surface will hit spherical zones on either surface. Using these probabilities the molecular incidence rates can be determined. While the probabilities have been found, analytic expressions for molecular incidence determination are very difficult to obtain. The problem was approached from a computer point of view and computer solutions with a high degree of accuracy were obtained. (Author)

AD-401 157 Div. 30, 31
(TISTE/JBM) OTS price $2.60

Naval Boiler and Turbine Lab., Philadelphia, Pa.
DIAMOND POWER SPECIALTY CORPORATION DIAMOND MODEL DP-300 DURA-PORT GAGE.
Evaluation Rept.,
by J. Isinger. 12 Mar 63, 6p. illus.
(Proj. no. B-518)
Unclassified report

DESCRIPTORS: *Pressure gauges, *Boilers, Vibration, Shock (Mechanics), Failure (Mechanics), Reliability, Check valves, High pressure valves, Shipborne.

Tests were conducted on a pressure gauge designed to operate at pressures up to 3000 psig to determine its suitability for shipboard service. The gage was first shock and vibration tested at the Naval Research Laboratory. The gage insert withstood shock and vibration tests without leakage or glass failure; the illuminator and hood assembly required modification to provide adequate shock and vibration resistance. The gage was installed on the Laboratory's DDG-15 boiler for determination of clarity and angle of visibility. Readability of the gage, requiring reliance on the color-refraction principle, was considered satisfactory while incorporating a better than 100 degree viewing angle. Optimum discernment of water level was obtained at distances ten to fifteen feet from the gage. A 256-hour full pressure test, with blowdown every forty-eight hours and a rapid pressure drop and rise every twenty-four hours, was conducted without steam leakage or mica or glass failure of the main insert. The shut-off valves showed no leakage at hand tightness during and after cooling. (Author)

AD-401 221 Div. 30, 15
(TISTP/MFA) OTS price $1.60

RAND Corp., Santa Monica, Calif.
AN INVERSE PROBLEM IN DYNAMIC PROGRAMMING AND AUTOMATIC CONTROL,
by Richard Bellman and Robert Kalaba. Apr 63. 6p. 5 refs. (Memo. no. RM-3592-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Adaptive control systems, *Analysis of variance, Control systems, Calculus of variations, Partial differential equations, Vector analysis, Feedback, Theory.

An investigation is made of the inverse of a basic problem of automatic control theory, namely, being given an optimal policy and the equations and inequalities representing the constraints of the problem, they seek the criterion function or functions that lead to this policy; methods of solution are found in some simple cases. (Author)

AD-401 227 Div. 30
(TISTP/JW) OTS price $2.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
MATICO. MACHINE APPLICATIONS TO TECHNICAL IN-

FORMATION CENTER OPERATIONS,
by Kenneth D. Carroll and Roger K. Summit.
Sep 62, 24p. incl. illus. refs. (Rept. no. 5-13-62-1)

Unclassified report

DESCRIPTORS: *Information retrieval, *Computers, Libraries, Magnetic tape, Scientific research, Data processing systems.

A modular development of a system for application of electronic equipment to various operations of the Technical Information Center is described. MATICO (Machine Applications to TIC Operations), as originally conceived by the LMSC Technical Information Center, is a series of phases, each contributing a real end-product to expedite and expand information services. The system is a result of the joint development efforts of the Technical Information Center and the Information Processing organization. Designed for the IBM 7090/1401 computer complex, the system includes the following major phases: Catalog Card Production, KWIC Index of Reports, Selective Dissemination of Information, Automated Search Program, and Auto-Abstracting. Each phase, as well as the complete program, has been so designed that it can be readily adapted to serve any information group confronted with the problem of volume processing of report literature; the dissemination of report information; and the storage and retrieval of document information. (Author)

AD-401 358 Div. 30, 17
(TISTP/JW) OTS price $3.00

Belfour Engineering Co., Suttons Bay, Mich.
DEVELOPMENT OF A MATERIALS PROPERTY DATA PROCESSING SYSTEM.
Final rept., 15 Mar 60-31 Aug 62 on Material Application,
by R. C. Braden and C. S. Wright. Jan 63, 170p. incl. illus. tables.
(Contract AF 33(616)7238, Proj. 7381)
(ASD TDR 63-128) Unclassified report

DESCRIPTORS: *Data processing systems, *Materials, Punched cards, Metallurgy, Bibliographies, Plastics, Information theory, Mechanical properties.

A mechanical properties information system including the operation of a fatigue of metals sub-system and the design-development and initial operation of other mechanical properties subsystems is outlined. These sub-systems, employing punched card equipment and techniques, actively provide mechanical properties data and associated descriptive information of metals and reinforced plastics. The System is intended primarily for the use of Defense Agencies and their contractors. Formats, codes and procedures utilized to store, retrieve and display mechanical properties of these materials are outlined. (Author)

AD-401 402 Div. 30
(TISTP/TL) OTS price $1.60

Operations Research Center, U. of Calif., Berkeley.
SYMMETRIC DUAL NONLINEAR PROGRAMS,
by G. B. Dantzig, E. Eisenberg, and R. W. Cottle.
20 Dec 62, 14p. 10 refs. (Research rept. no. 30; IER 172-35)
(Contract Nonr-22283)

Unclassified report

DESCRIPTORS: *Convex sets, *Differential equations, Functions, Vector analysis, Matrix algebra, Partial differential equations, Inequalities, Linear programming, Operations research.

AD-401 404 Div. 30
(TISTE/JBM) OTS price $2.60

Aeronautical Electronic and Electrical Lab., Naval Air Development Center, Johnsville, Pa.
TECHNICAL NOTE, AN INTRODUCTION TO ENVIRONMENTAL CHAMBER SYSTEMS ENGINEERING,
by Alvin R. Saltzman. 2 Apr 63, 22p. incl. illus. (Rept. no. NADC-EL-N6314)

Unclassified report

DESCRIPTORS: *Environmental tests, *Test facilities, *Control systems, *Electronic equipment, Reliability (Electronics), Simulation, Airborne, Time-lag theory, Stabilization, Analysis, Temperature control.

A systems engineering analytical method is presented of evaluating the response of an environmental chamber system to a thermal environment step input. Also presented are the advantages and disadvantages of using alternatives for various types of control actions. Emphasis is placed upon the effect of the electronic equipment and other components of the system acting as thermal load disturbances to chamber environmental controllers. (Author)

AD-401 410 Div. 30, 12
(TISTP/TL) OTS price $1.60

System Development Corp., Santa Monica, Calif.
UTILITY PROGRAM DESCRIPTIONS. MILESTONE 11.
MERGE CHANGE AND TRANSFER TAPES (SMERGE),
by H. Frieden. 12 Mar 63, 16p. incl. illus.
(Rept. no. TM-(L)-715/043/00)
(Contract AF 19(628)1648)

Unclassified report

DESCRIPTORS: *Data processing systems, *Magnetic tape, Programming (Computers), Satellites (Artificial), Identification, Input-output devices, Computer storage devices.

SMERGE produces an updated 1604-160A transfer tape and a duplicate backup tape from the existing transfer tape and the change tape prepared by SWRTOUT. Initially, the existing transfer tape contains only an end-of-file mark and the first updated transfer tape consists of the information on the change tape sorted into the proper order. Thereafter, the existing transfer tape is the updated transfer tape from the last time SMERGE was operated. (Author)

AD-401 447 Div. 30
(TISTP/FEM) OTS price $1.60

System Development Corp., Santa Monica, Calif.
UTILITY PROGRAM DESCRIPTIONS, MILESTONE 11,
SYMBOLIC DUMP ROUTINE (SYMDUMP),
by F. J. LaChapelle and R. L. Kinkead.
14 Mar 63, 12p. incl. illus. (Rept. no. TM-(L)-715/019/01)
(Contract AF 19(628)1648)

Unclassified report

DESCRIPTORS: *Programming (Computers), Data processing systems, Decision making, Errors, Data storage systems.

AD-401 450 Div. 30
(TISTP/FEM) OTS price $1.10

System Analysis Corp., Santa Monica, Calif.
INFORMATION FOR COP USERS 088 CARD READ AND 523

CARD PUNCH CAPABILITY,
by W. E. Taber. 25 Mar 63, 1p. (Rept. no. TM-892/004/00)
(Contract AF 19(628)1648)
Unclassified report

DESCRIPTORS: *Data processing systems, Programming (Computers), Punched cards, Input-output devices, Compatibility.

AD-401 451 Div. 30, 6, 12
(TISTA/VGW) OTS price $2.60

System Development Corp., Santa Monica, Calif.
SCHOPS/SWITCH CONTROL INTERFACE DOCUMENT,
by M. A. Franks. 1 Mar 63, 21p. incl. illus.
(Technical memo. TM(L)-832/000/01)
(Contract AF 19(628)1648)
Unclassified report

DESCRIPTORS: *Satellite networks, Logistics, Programming (Computers), Scheduling, Orbital trajectories, Tracking, Data processing systems.

SCHOPS is a scheduling program designed and written for the CDC 1604, which allocates the use of specified pieces of equipment or equipment complexes at the Satellite Test Annex (STA) and remote tracking stations for specific tasks on a temporal basis. In performing this function, SCHOPS assists the System Controller (SC) in the resolution of conflicts in demands for specific equipment and provides other necessary information for implementing the control of this equipment. A primary product of SCHOPS is a schedule of resource allocations for a prescribed scheduling period. The LMSC-developed Switch Control program, in turn, effects the actual switching of communication lines between the automatic data handling equipment, displays, and control equipment at the STA. (Author)

AD-401 452 Div. 30
(TISTP/FEM) OTS price $18.00

System Development Corp., Santa Monica, Calif.
160-A REFERENCE MANUAL,
by Reva P. Bennett and Eugene J. Rosenberg.
8 Feb 63, 1v. incl. illus. 7 refs. (Rept. no. TM-(L)-993)
(Contract AF 19(628)-1648)
Unclassified report

DESCRIPTORS: *Programming (Computers), *Data processing systems, Abstracts, Programming languages, Data storage systems, Computer storage devices, Input-output devices, Magnetic tape, Punched tape, Indexes.

A complete and current reference manual for all 160-A programming routines available in the CPDC is presented. Use of this document will effect better dissemination of checked-out routines and will reduce redundant programming efforts by 160-A users. It may also serve as training aid for new CPDC personnel. (Author)

AD-401 461 Div. 30
(TISTP/JW) OTS price $1.10

System Development Corp., Santa Monica, Calif.
SCF COMPUTER PROGRAM SYSTEMS MANUAL GENERAL PURPOSE SATELLITE PROGRAMS CORRECT APPARENT ELEVATION FOR REFRACTION (RC),
by Nancy Speer. 28 Jan 63, 3p. (Rept. no. TM-(L)-721/018/00)
(Contract AF 19(628)1648)
Unclassified report

DESCRIPTORS: *Programming (Computers), *Satellites (Artificial), Space surveillance systems, Data processing systems.

AD-401 462 Div. 30
(TISTP/JW) OTS price $1.10

System Development Corp., Santa Monica, Calif.
SCF COMPUTER PROGRAM SYSTEMS MANUAL GENERAL PURPOSE SATELLITE PROGRAMS COMPUTE SATELLITE POSITION IN CARTESIAN COORDINATES (CARTES),
by J. LaVine. 21 Jan 63, 5p. (Technical memo. no. TM-(L)-721/013/00)
(Contract AF 19(628)1648)
Unclassified report

DESCRIPTORS: *Programming (Computers), *Satellites (Artificial), Space surveillance systems, Data processing systems.

CARTES computes the position of a satellite in Cartesian Coordinates using given orbital position parameters. The accuracy of this program is affected only by the limitations of floating point arithmetic and the results obtained from the referenced subroutines. (Author)

AD-401 463 Div. 30, 12
(TISTP/JW) OTS price $1.10

System Development Corp., Santa Monica, Calif.
SCF COMPUTER PROGRAM SYSTEMS MANUAL GENERAL PURPOSE SATELLITE PROGRAMS CONVERT CORRECTED ELEVATION TO APPARENT (INVRC),
by Nancy Speer. 23 Jan 63, 3p. (Technical memo. no. TM-(L)-721/017/00)
(Contract AF 19(628)1648)
Unclassified report

DESCRIPTORS: *Programming (Computers), *Satellites (Artificial), Space surveillance systems, Data processing systems.

AD-401 600 Div. 30, 32
(TISTA/GEC) OTS price $7.00

Herner and Co., Washington, D. C.
BASIC RESEARCH RESUMES, 1961-1962. A SURVEY OF BASIC RESEARCH ACTIVITIES OF THE OFFICE OF AEROSPACE RESEARCH.
1962, 588p. (Rept. no. OAR-9)
(Contract AF 49(638)903)
Unclassified report

DESCRIPTORS: *Air force research, *Indexes, Chemistry, Physical chemistry, Physics, Metallurgy, Nuclear physics, Fluid mechanics, Electricity, Magnetism, Mathematics, Meteorology, Geophysics, Biology, Aviation medicine, Space medicine, Test facilities, Energy conversion, Control systems, Mechanics, Electromagnetic waves, Solid state physics, Sociology, Psychology, Abstracts.

This book is a set of indexed abstracts of research efforts supported by the Office of Aerospace Research. Current DD-613's for all relevant Office of Aerospace Research efforts were gathered together abstracted, and organized into 24 broad subject categories represented by the chapters of this book, and indexed them by contractor, principal investigator and contract number. (Author)

AD-401 644 Div. 30
(TISTP/FEM) OTS price $5.60

Eclipse Pioneer Div., Bendix Corp., Teterboro, N. J.
HIGH DENSITY OPTICAL MEMORY DRUM.
Final rept., Feb 61-May 62,
by W. W. Lee. Feb 63, 49p. incl. illus. tables.
(Contract AF 33(616)7995, Proj. 4421)
(ASD TDR 62-791) Unclassified report

DESCRIPTORS: *Computer storage devices, *Data storage systems, Optical coatings, Photographic images, Fiber optics, Density, Digital computers, Microminiaturization (Electronics), Design, Optical equipment components, Manufacturing methods.

The techniques of manufacture of high-density permanent storage devices for digital computers using optical techniques are discussed. The application of these techniques is shown in a feasibility model delivered to the Air Force under the subject contract. This memory has a storage capacity of over a million bits and occupies approximately 1/8 cu. ft. The experimental results are given and future plans are outlined. (Author)

AD-401 676 Div. 30
(TISTP/FR) OTS price $1.60

Naval Ordnance Lab., White Oak, Md.
FAST RISE-TIME PRESSURE-GAGE CALIBRATOR,
by R. H. Waser and V. C. D. Dawson. Mar 63, 7p. incl. illus. 3 refs. (Ballistics research rept. no. 86; NOLTR 62-218)
Unclassified report

DESCRIPTORS: *Pressure gages, Instrumentation, Shock tubes, Wind tunnels, Simulation, Calibration.

A pressure-gage calibration device is described which simulates both the magnitude and the rise-time characteristics of pressure pulses experienced in shocktubes and shocktube wind tunnels. The advantage of a device of this type over a static calibration device is that it provides the ability to detect any difference in the static and dynamic characteristics of gages. A discussion of the response of gages to pressures with short rise times is also included. (Author)

AD-401 717 Div. 30, 15
(TISTP/GRW) OTS price $1.60

Naval Oceanographic Office, Washington, D. C.
A STATISTICAL ROSE PROGRAM,
by Walter E. Yergen. Oct 62, 17p. incl. table. (Rept. no. SP-64)
Unclassified report

DESCRIPTORS: *Programming (Computers), *Statistical distribution, Tables, Statistical analysis, Computer logic, Digital computers.

This analysis describes and evaluates a computer program useful for the statistical processing of bivariate data fields expressed in polar coordinates. (Author)

AD-401 748 Div. 30, 15
(TISTP/GRW) OTS price $8.10

Moore School of Electrical Engineering, U. of Pennsylvania, Philadelphia.
INVESTIGATION AND EVALUATION OF UDOFTT MATHEMATICAL PROCEDURES,
by Morris Rubinoff, Harry J. Gray, Jr. and others. 7 Dec 62, 75p, incl. illus. table, 8 refs. (Contract N61339-838)
(Tech. rept. NAVTRADEVCEN 838-2)
Unclassified report

DESCRIPTORS: *Flight simulators, *Digital computers, Errors, Non-linear differential equations, Numerical methods and procedures, Matrix algebra, Integral transforms, Integration, Mathematical analysis, Feasibility studies.

An investigation was made of the mathematical methods used in the Universal Digital Operational Flight Trainer Tool (UDOFTT), which provided an evaluation from a theoretical and an experimental aspect, of mathematical methods used in UDOFTT. These mathematical methods were numerical ones used to solve simultaneous system of nonlinear differential equations of flight for the F-100A. The investigation was initiated with a study and summary of the mathematical theory that led to the development of stability charts for numerical quadrature formulas. The theory, which treated a single linear inhomogeneous differential equation, was extended to a simultaneous set of such equations and to a primitively nonlinear differential equation. This last equation led to the conjecture that stability charts could be applied to nonlinear differential equations to establish both stability and accuracy of their solutions. Finally, the last effort experimentally evaluated the accuracy of the numerical methods used by UDOFTT, as applied to the nonlinear differential equations of motion of the F-100A trainer. First, certain maneuvers were programmed to start from various initial conditions, and then by flying the trainer through the programmed maneuvers using different quadrature intervals. Quadrature intervals over the range of 100 msec to 10 msec were used and the resulting flights compared. (Author)

AD-401 767 Div. 30
(TISTE/JBM) OTS price $1.60

6571st Aeromedical Research Lab., Holloman Air Force Base, N. Mex.
THE FLYWHEEL AS A CENTRIFUGAL ACCELERATOR,
by Hubert C. Feder. Apr 63, 15p. 3 refs. (Rept. no. ARL-TDR-63-9)
Unclassified report

DESCRIPTORS: *Centrifuges, *Flywheels, *Test facilities, *Acceleration, Design, Velocity, Bearings, Heat transfer, Costs, Welding Stresses, Centrifugal fields.

Efforts concerned the investigation of a flywheel accelerator as a component of a 160 to 200-foot diameter circular track. The 22 spoke, box-construction flywheel could be made from commercially available steel plates. Based on optimal design conditions, the upper application limit, governed by the welding property of the material used, was found to be a test weight - load factor capacity of 230,000 pound - 300 g. The discussion, based on a linear dependence of flywheel weight, moment of inertia, power and cost on test weight, and cross-section of box members at constant radius and stress, shows that the lower application limit of the flywheel reaches far into the application range of proposed, arm-type centrifuges and that the flywheel is a logical necessity, if the test capacity of existing centrifuges needs to be exceeded. (Author)

AD-401 769 Div. 30
(TISTP/FEM) OTS price $10.10

Case Inst. of Tech., Cleveland, Ohio.
THE APPLICATION OF A THEORY OF MULTI-LEVEL SYSTEMS TO OPTIMIZATION PROBLEMS,
by Jerry L. Sanders. Feb 63, 119p. (Rept. no. SRC 24-A-63-12)
(Contracts Nonr-11409 and Nonr-114121)
Unclassified report

DESCRIPTORS: *Operations research, *Control systems, Statistical analysis, Probability, Statistical functions, Synthesis, Numerical analysis, Matrix algebra, Non-linear systems, Mathematical analysis.

Division 30 - RESEARCH AND RESEARCH EQUIPMENT

An attempt is made to simultaneously develop certain aspects of a theory of multi-level systems and decomposition techniques for multivariable optimization problems. Two level-three goal systems are explored intensively with particular reference to the method of coordination employed by the second level unit. Direct and Indirect Intervention modes are explored. The problem of the quantity of information required by the second level for the coordination of the first level systems is investigated. Direct and Indirect Models are investigated. The concept of the Indirect Model leads to the development of a Decomposition Principle for Non-Linear Programming. The analysis of a numerical example coded for the computer which demonstrates the utility of certain of the techniques in the context of a specific application is presented. (Author)

AD-401 799 Div. 30, 15
(TISTP/WH) OTS price $3.60

Polytechnic Inst. of Brooklyn, N. Y.
DUAL MODE CONTROL.
Master's thesis,
by Leonidas M. Mantgiaris. 26 Dec 62, 25p. incl. illus. 8 refs. (Rept. no. PIBMRI-1104-62)
(Contract DA ARO(D)-31-124-G144)
Unclassified report

DESCRIPTORS: *Feedback, *Servomechanisms, Differential equations, Transformations (Mathematics), Chemical engineering, Analog computers.

A simple compensation scheme for the control of a process is treated. The criteria are that the process output closely approximate the process input when the latter is a step and that there be no steady-state error. The reference process chosen is that of chemical concentration control. Employing a compensation block with pure gain gives a fast response that has a steady-state error. Integral compensation eliminates the steady-state error, but its response has a very sluggish transient character. A switching arrangement is evolved that combines the desirable characteristics of both types of compensations while removing the unwanted traits. This configuration is set up on an analog computer and compound results which satisfy the original criteria are empirically obtained for a plant of three poles. This is done for plants of two poles and one pole with equal success, exhibiting the validity of the technique for a general plant. (Author)

AD-401 818 Div. 30, 15, 9
(TISTP/FEM) OTS price $2.60

Wyoming U., Laramie.
A METHOD OF NUMERICALLY EVALUATING THE ERRORS RESULTING FROM MEASUREMENT OF SPECIFIC SHOCK IMPULSES BY ACCELEROMETERS DUE TO THE FREQUENCY RESPONSE CHARACTERISTICS OF THE ACCELEROMETER.
Master's thesis,
by Richard H. Jessen. Jan 63, 14p. incl. illus.
Unclassified report

DESCRIPTORS: *Accelerometers, *Shock, Measurement, Errors, Vibration, Acceleration, Velocity, Piezoelectric transducers, Transformations, Integral equations, Trigonometry, Functions, Time, Shock waves, Numerical analysis.

AD-401 832 Div. 30, 12
(TISTA/LSK) OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
RELIABILITY PROGRAM ENVIRONMENTAL TESTING AND SAMPLE SIZE GUIDE,
by F. P. Klein. 16 Nov 62, 14p. incl. illus. tables (Rept. no. TDR-169(3303)TN-1)
(Contract AF 04(695)169)
(SSD TDR 62-181) Unclassified report

DESCRIPTORS: *Guided missiles, *Spacecraft, Reliability, Reliability (Electronics), Test methods, Sampling, Environmental tests.

Environmental testing is a critical function in the evaluation and improvement of reliability of missile and space vehicles. When equipment and/or a subsystem operate successfully in the laboratory or factory, but fail to function satisfactorily in flight or in the field, the cause can often be attributed to incomplete or incorrect environmental test or simulation during the test program. This report considers environmental testing required for equipment and/or subsystems based on a balance of factors determining the high- or low-risk nature of a specific mission. It also considers determination of sample size requirements as an extension of over-all environmental testing. (Author)

AD-401 886 Div. 30
(TISTP/FEM) OTS price $4.60

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
ENGINEERING ANALYSIS AND DIGITAL SIMULATION OF THE OPTICAL RUSSIAN PRINT READER.
3 Sep 62, 45p. incl. illus. tables.
(Contract AF 30(602)2080, Proj. 4599).
(RADC TDR 62-472) Unclassified report

DESCRIPTORS: *Pattern recognition, *Reading machine, *Machine translation, Analysis, Errors, Sensitivity, Phase shifters, Digital computers, Analog computers, Data processing systems, Language, Optical images, Simulation.

The Optical Russian Print Reader (Converter Group, Print-To-Digital AN/GSA-29) has been assembled, the front end optics aligned, and the line following servo system analyzed with the assistance of Baird-Atomic personnel. An IBM 7090 simulation shows that the basic masking technique used for an idealized electro-optical system yields adequate discrimination levels only for very high quality characters and for very close tolerances on text registration. The report contains a detailed description of the servo analysis and masking technique simulation; it also includes error rate tabulations based on input text quality and proposed mask alterations. (Author)

AD-401 921 Div. 30
(TISTA/GEC) OTS price $3.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
SOME ASPECTS OF ENERGY TRANSFER IN THE ELECTRODE AND SETTLING SECTIONS OF AN ARC-HEATED WIND TUNNEL,
by William H. Carden. Apr 63, 28p. incl. illus. 4 refs. (Rept. no. AEDC-TDR-63-72)
(Contract AF 40(600)1000, Proj. 8950)
Unclassified report

DESCRIPTORS: *Hypersonic wind tunnels, Heat transfer, Calorimeters, Plasma physics, Thermodynamics, Heat shields, Test facilities, Electric arcs.

A calorimetric investigation of certain energy transfer processes in the settling region of an arc-heated wind tunnel was made. The effects of anode length and diameter on heat-transfer rates in the stilling chamber were studied for a range of flow conditions. A radiation-cooled heat shield for use in the stilling chamber was proposed and evaluated. A 20% reduction in the stilling chamber heat loss and a 5% gain in overall efficiency indicated with the installation of a suitable heat shield. (Author)

AD-402 143 Div. 30
(TISTP/FEM) OTS price $12.00

System Development Corp., Santa Monica, Calif.
MILESTONE 11. 160-A DIAGNOSTIC PROGRAM (SFCHEX).
12 Feb 63, 1v. incl. illus. (Technical memo. no. TM 1003/002/00)
(Contract AF 19(628)1648)
Unclassified report

DESCRIPTORS: *Programming (Computers), Input-output devices.

SFCHEX (160-A Diagnostic Program) allows the user to dump any portion of his program at any time, modify parameters or instructions as he desires and to jump from point to point in his program. SFCHEX performs these functions by accepting directions via the typewriter or on-line card reader. Considers the input and ouput formats and the operating instructions of the program. (Author)

AD-402 144 Div. 30
(TISTP/FEM) OTS price $5.60

System Development Corp., Santa Monica, Calif.
MILESTONE 11; OSAS-A MODIFIED FOR AUGMENTATION (SOSAS),
by C. L. Hill. 15 Mar 63, 52p. incl. illus.
3 refs. (Technical memo. no. TM-1003/009/00)
(Contract AF 19(628)1648)
Unclassified report

DESCRIPTORS: *Programming (Computers), Input-output devices, Data storage systems.

SOSAS (OSAS-A Modified for Augmentation) allows the writing of programs for the 160-A computer in symbolic notation with minimum regard for ultimate storage locations assigned a given program. Instructions using mnemonic symbols can be written; these are easier to remember and to interpret later than are the octal machine code equivalents. The primary difference between SOSAS and OSAS-A is the handling of a System Symbol Table by SOSAS. (Author)

AD-402 145 Div. 30, 18
(TISTP/FEM) OTS price $3.60

System Development Corp., Santa Monica, Calif.
A STUDY IN PROBABILISTIC INFORMATION PROCESSING (PIP),
by Richard J. Kaplan and J. Robert Newman.
2 Apr 63, 36p. incl. illus. tables, 2 refs.
(Technical memo. no. TM-1150/000/00)
(Contract SD 99)
Unclassified report

DESCRIPTORS: *Statistical analysis, *Decision making, Human engineering, Data processing systems, Computers, Game theory, Probability.

A pilot study that tests the application of some principles of PIP (Probabilistic Information Processing) theory outlined by Edwards (1962) is presented. The findings of an unpublished study by Hayes, Phillip, and Edwards at the University of Michigan, that humans seem to be quite conservative in coming to conclusions about which hypothesis is correct is supported. Several deficiencies in this experiment are summarized: (1) The tasks given the subjects were too simple, long and boring; (2) Because of a lack of facilities it was not possible to give feedback to the subjects; (3) Probability estimation by itself is not an interesting psychological or system problem; and (4) The technique used to generate the data, while adequate for this study, left much to be desired. (Author)

AD-402 175 Div. 30
(TISTP/FEM) OTS price $9.10

System Development Corp., Santa Monica, Calif.
NEW AND MODIFIED 1604 COMPUTER PROGRAMS IN SUPPORT OF AUGMENTATION. MILESTONE 5,
by J. L. Little. 6 Mar 63, 99p. incl. illus.
(Technical memo. no. TM-(L)-1071/000/00)
(Contract AF 19(628)1648)
Unclassified report

DESCRIPTORS: *Programming (Computers), Errors, Input-output devices, Data processing systems, Telemetering data, Data storage systems, Magnetic tape.

Describes the new and modified 1604 Flight Support programs produced in support of Augmentation: (1) Station Position (STPOS); (2) Telemetry Mode Selection Input (STEM); (3) Write Change Tape (SWRTOUT); (4) Merge Change and Transfer Tapes (SMERGE); (5) 1604 to Bird Buffer Communication (SBRDTLK); (6) Read Bird Buffer/1604 Transfer Tape (SRDTRK); and (7) Station Requirements Table (SREQTAB). (Author)

AD-402 176 Div. 30
(TISTP/FEM) OTS price $3.60

System Development Corp., Santa Monica, Calif.
UTILITY PROGRAM DESCRIPTIONS MILESTONE 11. 1604 TO BIRD BUFFER COMMUNICATION (SBRDTLK),
by S. A. Gardner. 19 Mar 63, 33p. incl. illus.
6 refs. (Rept. no. TM-(L)-715/045/00)
(Contract AF 19(628)1648)
Unclassified report

DESCRIPTORS: *Programming (Computers), Computers, Magnetic tapes, Data transmission systems.

The 1604 to Bird Buffer Communication (SBRDTLK) program provides the communication link between the 1604 and Bird Buffer (160A) computers via a tape control unit operating in the satellite mode. (Author)

AD-402 195 Div. 30, 12
(TISTP/JEA) OTS price $5.60

System Development Corp., Santa Monica, Calif.
USERS MANUAL FOR THE AIR FORCE COMPUTER PROGRAM DEVELOPMENT CENTER (AF/CPDC).
1 Apr 63, 1v. incl. illus. (Rept. no. TM-871/000/00)
(Contract AF 19(628)1648)
Unclassified report

DESCRIPTORS: *Data processing systems, *Instruction manuals, *Input-output devices, Magnetic tape, Punched cards, Operation, Monitors, Machine translations, Analysis, Coding, Corrections, Sequences, Satellite networks, Punched tape, Digital computers, Reading machines, Programming (Computers), Digital systems.

Division 30 - RESEARCH AND RESEARCH EQUIPMENT

The Air Force Computer Program Development Center (AF/CPDC) is established to provide data processing services to all individuals and/or organizations that are specified by the Air Force Space Systems Division (AFSSD), and who are associated with the Satellite Control Network. To help accomplish this mission, these procedures were prepared to give all users effective and efficient data processing service. The purpose of the manual is to outline CPDC services and procedures. (Author)

AD-402 198 Div. 30
(TISTP/FEM) OTS price $2.60

System Development Corp., Santa Monica, Calif.
COMPUTER OPERATING INSTRUCTIONS FOR THE SYSTEM SIMULATED TELEMETRY DATA GENERATION PROGRAM (STSTLM) MILESTONE 7,
by J. Ng. 22 Mar 63, 16p. incl. illus. tables.
(Rept. no. TM-(L)-734/035/00)
(Contract AF 19(628)1648)
Unclassified report

DESCRIPTORS: *Programming (Computers), *Telemetering data, Input-output devices, Errors, Reading machines, Simulation.

The Simulated Telemetry Data Generation Program (STSTLM) has been designed to generate a simulated tape (TLM-tape) containing input data for the TLM computer at the Tracking Station. The STSTLM program will also generate the System Time Code Word (STCW) and the Input Control Word in exactly the same format as they are normally input to the TLM Computer. (Author)

AD-402 199 Div. 30, 12
(TISTP/JEA) OTS price $1.10

System Development Corp., Santa Monica, Calif.
UTILITY PROGRAM DESCRIPTIONS MILESTONE 11 UPDATE BIRD BUFFER - 1604 TRANSFER TAPE (SDELET),
by R. C. Wise. 26 Mar 63, 7p. incl. illus
(Rept. no. TM-(L)-715/050/00)
(Contract AF 19(628)1648)
Unclassified report

DESCRIPTORS: *Input-output devices, *Punched tape, *Programming (Computers), Tests, Digital systems, Instruction manuals, Test methods, Punched cards, Programming languages, Corrections, Satellite networks, Preparation, Space surveillance systems.

SDELET updates the Bird Buffer to 1604 transfer tape by the deletion of obsolete files of information. (Author)

AD-402 200 Div. 30, 12
(TISTP/JEA) OTS price $2.60

System Development Corp., Santa Monica, Calif.
MILESTONE 7. PREPARE MASTER TAPE II (PMTII),
by R. L. Kinkead. 18 Mar 63, 29p. (Technical memo. no. TM-1099/000/00)
(Contract AF 19(628)1648)
Unclassified report

DESCRIPTORS: *Input-output devices, *Programming (Computers), *Punched tapes, Punched cards, Satellite networks, Data processing systems, Coding, Corrections, Typewriters, Processing, Programming languages, Magnetic tape, Space surveillance systems, Preparation.

AD-402 201 Div. 30
(TISTP/WH) OTS price $3.60

System Development Corp., Santa Monica, Calif.
MILESTONE 11 PREPARE BIRD BUFFER SYSTEM TAPE (SPST),
by R. C. Wise. 10 Mar 63, 35p. incl. illus. tables, 14 refs. (Technical memo. no. TM-1003/005/00)
(Contract AF 19(628)1648)
Unclassified report

DESCRIPTORS: *Programming (Computers).

The Prepare System Tape program (SPST) will initially generate a Bird Buffer System tape from a specially formate input deck, or subsequently edit any part of an existing system tape. SPST was validated by constructing operational Bird Buffer System tapes. (Author)

AD-402 202 Div. 30, 12
(TISTW/JEA) OTS price $1.10

System Development Corp., Santa Monica, Calif.
PROPOSAL FOR ADDITIONAL MODIFICATIONS TO MULTICON,
by H. J. Frieden. 27 Mar 63, 5p. incl. tables.
(Technical memorandum no. TM-(L)-890/007/00A)
(Contract AF 19(628)1648)
Unclassified report

DESCRIPTORS: *Space surveillance systems, *Time interval counters, *Programming (Computers), Computer logic, Data processing systems, Satellites (Artificial), Time signals, Errors, Tracking, Satellite networks.

AD-402 203 Div. 30
(TISTP/WH) OTS price $1.10

System Development Corp., Santa Monica, Calif.
UTILITY SYSTEM PROGRAMMING PROPOSALS. PROPOSAL FOR A BLOCK PSEUDO OPERATION IN LARII,
by F. J. LaChapelle. 6 Mar 63, 4p. (Technical memo. no. TM-890/010/00)
(Contract AF 19(628)1648)
Unclassified report

DESCRIPTORS: *Programming (Computers).

AD-402 204 Div. 30, 12
(TISTW/JEA) OTS price $1.10

System Development Corp., Santa Monica, Calif.
COMBINED MILESTONE III-IV FOR THE 1604 AUGMENTATION COMMUNICATION PROGRAMS,
by S. Gardner, H. Frieden and others. 17 Jan 63, 9p. 4 refs. (Technical memorandum no. TM-891/001/00A)
(Contract AF 19(628)1648)
Unclassified report

DESCRIPTORS: *Programming (Computers), *Magnetic tape, *Space surveillance systems, Multiple operation, Input-output devices, Selection, Reading machines, Specifications, Satellite networks.

AD-402 205 Div. 30, 12
(TISTW/JEA) OTS price $1.60

System Development Corp., Santa Monica, Calif.
UTILITY SYSTEM PROGRAM SPECIFICATIONS MASTER TAPE CONTROL II (MTCII), MOD AG,
by B. R. Pruett. 1 Apr 63, 14p. (Technical memorandum no. TM-891/005/00)
(Contract AF 19(628)1648)
Unclassified report

DESCRIPTORS: *Space surveillance systems, *Magnetic tape, *Programming (Computers), Specifications, Simulation, Reduction, Data processing systems, Punched cards, Punched tape, Satellite networks, Control systems.

AD-402 206 Div. 30, 12
(TISTW/JEA) OTS price $1.60

System Development Corp., Santa Monica, Calif.
COMBINED MILESTONE 3-4 FOR THE 1604 AUGMENTATION COMMUNICATION PROGRAMS,
by S. Gardner, H. Frieden and others. 18 Feb 63, 23p. incl. illus. (Technical memo. no. TM-891/001/00B)
(Contract AF 19(628)1648)
Unclassified report

DESCRIPTORS: *Space surveillance systems, *Input-output devices, *Programming (Computers), Magnetic tape, Checkout equipment, Errors, Selection, Data storage systems, Satellite networks, Reading machines, Satellites (Artificial), Programming (Computers), Space surveillance systems.

AD-402 207 Div. 30, 12
(TISTP/JW) OTS price $19.75

Wolf Research and Development Corp., West Concord, Mass.
SPADATS SYSTEM SUPPORT.
Jan 63, 1v. incl. illus. tables.
(Contracts AF 19(604)5523, AF 19(604)6117 and others.
(ESD-TDR-63-334) Unclassified report

DESCRIPTORS: *Space surveillance systems, Programming (Computers), Computers, Data processing systems.

Complete descriptions and operating instructions for a collection of programs used at the SPADATS Center, Ent Air Force Base, Colorado Springs, Colorado are given. The collection is primarily useful as an aid to analysts in their task of positively identifying objects detected in space. The documentation does not purport to describe a total system, but rather those programs which were deemed necessary to complement and support an already existing one. (Author)

AD-402 209 Div. 30
(TISTW/JEA) OTS price $2.60

System Development Corp., Santa Monica, Calif.
FLIGHT SPECIFIC COMPUTER PROGRAM DESCRIPTION ALARM CLOCK (ALACK) MILESTONE 11,
by D. J. Persico. 28 Mar 63, 21p. incl. illus.
(Technical memo. no. TM-(L)-742/006/00)
(Contract AF 19(628)1648)
Unclassified report

DESCRIPTORS: *Position finding, *Time-interval counters, *Input-output devices, Satellite networks, Magnetic tape, Clocks, Target acquisition, Data processing systems, Reading machines, Punched cards, Satellites (Artificial), Space surveillance systems, Programming (Computers).

AD-402 210 Div. 30
(TISTW/JEA) OTS price $1.10

System Development Corp., Santa Monica, Calif.
NEW 1604 COMPUTER PROGRAMS MILESTONE 5 (SUPPLEMENT) INPUT TRACKING DATA (STAPIN),
by Nancy J. Speer. 14 Mar 63, 28p. (Technical memo. no. TM-(L)-793/003/00A)
(Contract AF 19(628)1648)
Unclassified report

DESCRIPTORS: *Input-output devices, *Space surveillance systems, Selection, Data processing systems, Magnetic tape, Operation, Reading machines, Programming (Computers).

The subroutine, Input Tracking Data (STAPIN) is being revised to include a general input capability in addition to the selective input capability originally designed. In brief, the selective input capability requires the user program to specify the data to be input by providing station number, revolution number, and antenna identification. STAPIN then requests the data by station, revolution and vehicle number from either the Operator or SRDTRK, depending on whether data transmission is via paper tape or the Bird Buffer Transfer Tape. If transfer tape is used, SRDTRK searches for the specified data. When the data are found, SRDTRK sets the interlock on the interrupt capability until STAPIN indicates that it is through with the input process; at which time the interlock is removed and the Transfer tape is positioned at its logical end. (Author)

AD-402 219 Div. 30
(TISTP/FEM) OTS price $1.10

System Development Corp., Santa Monica, Calif.
UTILITY SYSTEM PROGRAMMING PROPOSALS. PROPOSAL FOR MODIFYING PREPARE MASTER TAPE II (PMTII) ROUTINE,
by R. L. Kinkead. 29 Mar 63, 2p. (Technical memo. no. TM-890/013/00)
(Contract AF 19(628)1648)
Unclassified report

DESCRIPTORS: *Programming (Computers), Tapes.

It is proposed that PMTII (Prepare Master Tape II) mod AC be modified to read and scan each element on the base tape to obtain its direct references, if the use of a base tape on unit one were specified on the function card. The report states that these references could then be used in developing the new master tape directory's cross-reference block as it is done at present. (Author)

AD-402 220 Div. 30
(TISTW/JEA) OTS price $1.10

System Development Corp., Santa Monica, Calif.
UTILITY SYSTEM PROGRAM SPECIFICATIONS,
by R. L. Kinkead. 3 Apr 63, 4p. ref. (Rept. no. TM-891/008/00)
(Contract AF 19(628)1648)
Unclassified report

DESCRIPTORS: *Programming (Computers), *Magnetic tape, Input-output devices, Specifications, Punched cards, Errors, Computer logic, Loading (Mechanics), Corrections.

AD-402 221 Div. 30
(TISTW/JEA) OTS price $1.10

System Development Corp., Santa Monica, Calif.
RELEASE OF BIRD BUFFERE SUPPORT SUBSYSTEM MILESTONE 8,
by R. C. Wise. 29 Mar 63, 2p. (Rept. no. TM-1145/000/00)
(Contract AF 19(628)1648)
Unclassified report

DESCRIPTORS: *Programming (Computers), *Programming languages, Magnetic tape, Punch cards, Check out equipment Loading (Mechanics), Sensitivity.

AD-402 244 Div. 30, 32
(TISTB/AW) OTS price $15.50

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
AUTOMATIC LANGUAGE TRANSLATION.
Final rept.
15 Jan 63, 224p. incl. illus. tables.
(Contract AF 30(602)2617)
(RADC TDR 63-102) Unclassified report

DESCRIPTORS: *Machine translation, *Language, Analysis, Automatic.

Accomplishments for 1962 in the development of the AN/GSQ-16 language translating complex are described. This involved studies in linguistic research, conversion to a bidirectional single-pass dictionary mode and, in its incipient stage, to a multipass mode. The search and programming techniques developed during the year, particularly the rapid subtable searching of core memory and the program for generative grammars, are described along with the basic linguistic researches into machine translation problems, compilation of data for the grammatical feature of government in Russian grammar, and generation of new grammar tables embodying grammatical analysis and sentence structure determination. Improvements made, and those contemplated, to machine components and to the system organization are also reported. (Author)

AD-402 375 Div. 30
(TISTP/FR) OTS price $2.60

Woods Hole Oceanographic Institution, Mass.
THE RADIO DROGUE SYSTEM,
by Charles E. Parker. Mar 63, 24p. incl. illus.
(Ref. no. 63-12)
(Contract Nonr 335100)
Unclassified report

DESCRIPTORS: *Ocean currents, Measurement, Instrumentation, Buoys, Drag parachutes, Radio receivers, Radio transmitters, Meters, Telemeter systems, Thermistors.

A system was developed for directly measuring deep ocean currents covering many months of time. The incorporation of a long range telemetering radio of 50 watts output in a surface buoy secured to a large cargo-type parachute drogue by 50 to 4000 meters of cable, has made it possible to follow these drogues by aircraft. Current flow patterns at various depths can now be realized which cover large areas of open ocean. Provisions have been made to include in the system sensors for temperature readings at depth, wind direction and velocity, and intermediate self contained current meters. (Author)

AD-402 446 Div. 30, 6
(TISTP/PCR) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
MAGNETOMETER,
by N. N. Zatsepin. 28 Mar 63, 4p. (Trans. no. FTD-TT-62-1874 from Russian Patent No. 144546 (Appl. No. 676266/24, 12 Aug 1960), pp. 1-3, 1960)
Unclassified report

DESCRIPTORS: *Magnetometers, Design, Theory, Patents.

31. SHIPS AND MARINE EQUIPMENT

AD-402 194 Div. 31
(TISTP/FR) OTS price $2.60

Technical Research Group, Syosset, N. Y.
REPORT ON A SEMINAR ON THE HYDRODYNAMIC THEORY ASSOCIATED WITH SHIP MOTION IN WAVES,
by Paul Kaplan and Jack Kotik. 1963, 23p. incl. illus. 43 refs. (Rept. no. TRG-140-FR)
(Contract Nonr 317500)
Unclassified report

DESCRIPTORS: *Ships, Motion, Water waves, Hydrodynamics, Pitch (Motion), Symposia.

The theory of the motions of a ship in waves was developed along two major diverse paths. Various practical investigators and some designers have used results based on many questionable assumptions, while more academic investigators have studied isolated parts of an overall motion analysis (e.g. damping and added mass coefficients) or have treated idealized problems having no direct application to practice. As an example of practical approaches the work of Korvin-Kroukovsky and Jacobs develops a set of coupled linear differential equations for heave and pitch of a ship in regular head seas, and the coefficients used there are the values obtained by 'strip theory', i.e. by use of integrals of two-dimensional quantities. A number of different methods have been used to calculate the two-dimensional coefficients which appear in such sets of differential equations, each having different degrees of validity and simplicity. Similarly there exists a number of different expressions for hydrodynamic forces on oscillating bodies advancing on or below the free surface, which have been obtained within what is considered to be a three-dimensional analysis (subject to certain simplifications such as thin-ship, slender-body, symmetry, etc.). (Author)

AD-402 265 Div. 31, 30
(TISTW/JEA) OTS price $3.60

Operations Evaluation Group, Office of Naval Operations.
MODEL AND COMPUTER PROGRAM FOR CALCULATING THE KILL PROBABILITIES FOR CERTAIN ASW TACTICS.
Interim research memo,
by S. H. Howe and P. W. McCree, Jr. 15 Nov 62, 28p. incl. illus. tables (Rept. no. IRM-25)
Unclassified report

DESCRIPTORS: *Antisubmarine warfare, *Antisubmarine fire control systems, *Programming (Computers), Models (Simulation), Tactical warfare, Submarines, Equations, Programming languages, Kill probabilities, Effectiveness.

Research describes a model and computer program designed to compute kill probabilities for certain firing tactics waged against an evading submarine. The model was developed assuming that the attack is imminent and that the weapon will be directed at the point where the submarine was last contacted. The model's design is centered around a determination of sets of points which represents the locus of the evading submarine. The locus is determined by variation of a simple evasion tactic. The aimpoint is considered to be circularly, normally distributed about the true position of the submarine at the time of last contact. (Author)

AD-402 440 Div. 31
(TISTE/JBM) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
BARGES WITH TELESCOPIC TENT COVERING,
by M. Burak. 25 Mar 63, 4p. incl. illus.
(Trans. no. FTD-TT-62-1519 from Rechnoy Transport, No. 12, p. 29, Dec 61)
Unclassified report

DESCRIPTORS: *Barges, Tents, Hatches, Protective coverings.

32. MISCELLANEOUS ARTS AND SCIENCES

AD-401 141 Div. 32
(TISTB/AW) OTS price $4.60

RAND Corp., Santa Monica, Calif.
COMMUTING AND THE RESIDENTIAL DECISIONS OF CHICAGO AND DETROIT CENTRAL BUSINESS DISTRICT WORKERS,
by John F. Kain. Apr 63, 43p. incl. illus. tables (Rept. no. P-2735)
Unclassified report

Presented at the Conference on Transportation Economics, Sponsored by the National Bureau of Economic Research, New York, N. Y., April 26-27, 1963.

DESCRIPTORS: *Traffic, *Transportation, *Housing, Costs, Economics, Labor, Passenger vehicles, Railroads, Sociology, Distribution, Theory, Models (Simulations), Urban areas.

The problem of how to provide access to central urban workplaces for high- and middle-income commuters is discussed. The great impact of racial discrimination on the travel behavior and residential location decisions of both whites and non-whites is illustrated. The paper's insights into the determinants of residential location decisions and the choices among transportation media should be useful. A more important objective is the development and testing of a fairly simple but nonetheless powerful economic model that will be useful in explaining and predicting the travel and residential behavior of the urban population. The consumer-choice model described emphasizes several kinds of economic calculations assumed to be made by urban workers in deciding on the mode or combination of transportation modes they use for the journey-to-work, the distance they commute, the time they spend commuting, and the amount of residential space they consume (or the residential density at which they reside). The second important set of tradeoffs embraces the substitution possibilities between travel-time and money-cost expenditures for the journey-to-work. (Author)

AD-401 309 Div. 32
(TISTB/AW) OTS price $3.60

National Research Council, Div. of Engineering and Industrial Research, Washington, D. C.
THE COMMITTEE ON FIRE RESEARCH.
Final rept., 1 July 59-30 June 62.
30 June 62, 1v.
(Contract CD-SR-58-45)
Unclassified report

DESCRIPTORS: *Fires, Symposia, Control, Standards, Forest fires, Models (Simulation), Research program administration.

AD-401 312 Div. 32, 30
(TISTP/GRW) OTS price $3.60

Aerospace Information Div., Washington, D. C.
ELECTRONIC COMPUTERS, TRANSFORMATION OF TYPES S + S, S + P + S, V + S, AND V + P + S RUSSIAN SYNTAGMS,
by V. P. Manolova. 26 Mar 63, 37p. incl. tables, 14 refs. (AID rept. T-63-41)
Unclassified report

DESCRIPTORS: *Language, *Computers, Computer logic, Tables, Classification, Machine translation.

AD-401 347 Div. 32
(TISTB/AW) OTS price $5.60

American Library Association, Chicago, Ill.
THE LIBRARY AND INFORMATION NETWORKS OF THE FUTURE,
8 Apr 63, 43p. incl. illus. refs.
(Contract AF 30(602)2578)
(RADC-TDR-62-614)
Unclassified report

DESCRIPTORS: *Libraries, *Information retrieval Communication systems, History, Catalogs, Documentation, Electronics, Automation, Electronic equipment.

This report describes the environmental framework for an electronic information center of the future and forecasts a network system of information communication. It is based in part on the experiences gained by the American Library Association in planning its LIBRARY-21 exhibit at the Seattle World's Fair. The report is organized into three main sections. The first describes the structure and organization of ALA's electronic library of the future (LIBRARY-21) and includes a summary of the ideas which went into its planning. The second introduces the concept of regional information networks and explains the requirement for such networks and the likely effects of technology on their development. This section also attempts to provide a realistic suggestion for implementing regional information networks; for purposes of illustration, it describes in some detail how Air Force contractor reports would be treated within such a design. Section III is a compendium of various applicable systems and equipment which are either available for use today or can be expected as part of tomorrow's technological development. Emphasis is given throughout the report to the critical needs of government, industry, and research groups for improved information systems. Attention is also focused on the personal needs of the individual user. (Author)

AD-401 412 Div. 32
(TISTW/JEA) OTS price $4.60

System Development Corp., Santa Monica, Calif.
IDENTIFICATION OF PROBLEM AREAS IN THE WEAPONS DIRECTOR FUNCTION THROUGH CRITICAL INCIDENTS,
by K. H. Furukawa. 15 Jan 63, 43p. 5 refs.
(Rept. on TM-956)
(Contract AF 19(628)1648)
Unclassified report

DESCRIPTORS: *Weapon systems, *Military personnel, *Group dynamics, *Job analysis, Operation, Adjustment, Data processing systems, Behavior, Motivation, Reaction (Psychology). Compatibility, Personnel management, Personnel, Weapon systems.

As a part of the Weapons Director Workload Analysis Project, an application of the critical incident technique was made to obtain data which could be analyzed in identifying problem areas of the Weapons Director (WD) function. Identification of these areas provided a basis for recommendations in improving the effectiveness of the Weapons Director's operations. The study sought to accomplish the following objectives: (1) to obtain incidents of effective and ineffective behaviors in the performance of the WD position; (2) to obtain incidents of effective and ineffective behaviors of the SWD and the INDs in their interactions with the WD; (3) to obtain incidents concerning situations in which the WD was hindered in the effective performance of his job by limitations or constraints imposed by the console equipment, communications equipment, computer programs and standard operating procedures related to his position; (4) to systematically collect and analyze these incidents in identifying problem areas and to provide a basis for recommendations in improving the function. (Author)

AD-401 445 Div. 32
(TISTB/AW) OTS price $3.60

System Development Corp., Santa Monica, Calif.
THE MICROSTATISTICS OF TEXT,
by Lauren B. Doyle. 21 Feb 63, 36p. incl. illus. tables, 14 refs. (Rept. no. SP-1083)
Unclassified report

DESCRIPTORS: *Abstracts, *Documentation, *Indexes, Language, Statistical analysis, Data processing systems, Libraries, Feasibility studies, Automatic.

A reappraisal of the role of statistics in text analysis is presented. Current inhibiting influences in the use of statistics are discussed. The question of descriptive vs predictive statistics is explored at some length. A distinction between macrostatistics and microstatistics is made, with the implication that the former should be used in describing libraries whereas the latter should be used in describing written language. The relationship between the probability of occurrence of a word or word group in text and the cognitive effect of such a word or word group is discussed. This relationship is then illustrated through statistical data on word pairs; statistics of pairs which are directly linked in a sentence-structure tree are compared to statistics of pairs which, though the words are adjacent in text, are not directly linked in such a tree. This study of statistics as a function of sentence structure is then extended to units of text larger than a word pair. The problem of selecting and displaying content-indicative word groups in condensed representations of documents is discussed. It is explained why the statistical approach, by itself or in conjunction with other techniques, is unavoidable in a problem such as automatic abstracting, and the perils faced by some nonstatistical methods which have been talked about in the recent literature are illustrated. (Author)

AD-401 490 Div. 32
(TISTB/AW) OTS price $3.60

RAND Corp., Santa Monica, Calif.
INPUT-OUTPUT AND SOVIET PLANNING A SURVEY OF RECENT DEVELOPMENTS,
by Abraham S. Becker. Mar 63, 27p. 69 refs. (Memo. rept. no. RM-3532-PR)
(Contract AF 49(638)700)
Unclassified report

DESCRIPTORS: *Economics, *Production, Industrial production, Scheduling, Costs, Abundance, Communism, Models (Simulations), Linear programming, Mathematical prediction, Mathematical analysis.

After a quarter-century of rejection, mathematical economics was admitted into Soviet economic discussion in the mid-1950's, as part of the post-Stalin liberalization movement. The 1962-plan exercise computed gross outputs using final demand as the starting point. In contrast to their earlier insistence on gross outputs as the starting point, Soviet planners now appear to favor starting with final demand as a general approach. Military outlays and expenditures on research and development can be easily visualized as ends rather than means. Somewhat less obviously this also applies to consumption, because of its higher priority status under Khrushchev than under Stalin, and in terms of the possibility of maintaining planners' sovereignty by more effective stipulation of the consumption bill of goods. Among the mathematical economists, a significant body of opinion favors the creation of a giant automated data processing network, linking mathematicized enterprise plans in regional and interregional matrices. It is now clear that the regime will continue to permit experimentation with the tools of mathematical analysis. The direction and outcome of this experimentation will depend on the particular resolutions found for sensitive issues of economic policy. (Author)

AD-401 755 Div. 32, 20
(TISTP/FEM) OTS price $1.60

Radiation Effects Information Center, Columbus, Ohio.
MONTHLY ACCESSION LIST -- COORDINATE INDEX, PART II FOR ACCESSION LISTS 60 (REVISED) AND 61.
15 Mar 63, 17p. (REIC Accession List 60 (Rev.) and 61)
Unclassified report

DESCRIPTORS: *Radiation effects, *Indexes, Abstracts, Documentation, Classification, Subject indexing, Information retrieval.

AD-401 778 Div. 32
(TISTB/AW) OTS price $3.60

RAND Corp., Santa Monica, Calif.
EXPORT CONCENTRATION AND FLUCTUATIONS IN EXPORT EARNINGS: A CROSS-SECTION ANALYSIS,
by Benton F. Massell. Mar 63, 34p. incl. tables, refs. (Research memo. no. RM-3432-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Economics, *Commerce, Statistical analysis, Money.

The study attempts to determine empirically the extent to which intercountry variation in the instability of export earnings can be explained by the degree of export concentration. In a sample of 36 countries, regression analysis is used to estimate the relationship between the instability of a country's export earnings (dependent variable) and the commodity concentration of its exports (independent variable). Other independent variables are successively introduced: (1) the geographical concentration of exports and (2) the ratio of primary-product exports to total exports. The data indicate a significant but weak net relationship between export-earnings instability and the commodity concentration of exports; and only a marginally

stronger net relationship between instability and the primary-product ratio. Much of the intercountry variation in export-earnings instability fails to be explained by the independent variables considered. One can conclude that in general neither diversification nor industrialization is likely to reduce greatly the amplitude of fluctuations in a country's export earnings. (Author)

AD-401 830 Div. 32, 30
(TISTA/GEC) OTS price $2.60

Bell Aerosystems Co., Buffalo, N. Y.
COMPILATION OF UNPUBLISHED MATERIALS INFORMATION. PHASE II. CURRENT MATERIALS, RESEARCH AND DEVELOPMENT PROGRAMS IN EFFECT.
Final semi-annual rept. no. 2 on Phase II.
15 Apr 63, 17p. (Rept. no. 2084-933002)
(Contract AF 33(657)8555)
Unclassified report

DESCRIPTORS: *Scientific research, Solid rocket propellants, Fuel additives, Materials, Chemical milling, Ceramic materials, Pressure, Alloys, Coatings, Structures, Production, Welding, Abstracts.

Summaries are presented of some of the materials research and development programs being conducted at the Bell Aerosystems Company, Aerospace/Rockets Division during 1963. The programs described are company sponsored. The summaries consist of an abstracted and identifying version of materials research and development efforts presently scheduled and in effect. The purpose is to identify sources of potential information. (Author)

AD-402 098 Div. 32
(TISTB/AW) OTS price $23.50

Human Sciences Research Inc., Arlington, Va.
AN APPROACH TO THE STUDY OF SOCIAL AND PSYCHOLOGICAL EFFECTS OF NUCLEAR ATTACK,
by Peter G. Nordlie. Mar 63, 1v. incl. illus. 374 refs. (Rept. no. HSR-RR-63/3-Rr)
(Contract OCD-OS-62-62)
Unclassified report

DESCRIPTORS: *Civil defense systems, *Nuclear warfare, *Sociology, Disasters, Psychology, Culture, Stress (Psychology), Behavior, Reaction (Psychology), Survival.

This effort is designed to draw together the findings and methods of the behavioral science disciplines for the purpose of making a unified set of projections about social life in American society following massive thermonuclear attack. From such projections of the likely post-war world, systematic inferences are being drawn about the capabilities and vulnerabilities of the American society and the implications these may have for the short and long run recovery of society and for the planning and development of civil defense countermeasures. Thus, parallel with the effort being made by others to assess the physical damage and the physical resources remaining after a nuclear attack, this study has as its goal the determination of the social resources and the social requirements which civil defense planners must use and meet in mobilizing Americans to behave coherently before, during, and for a long time after a massive thermonuclear attack. (Author)

AD-402 137 Div. 32
(TISTB/AW) OTS price $1.60

RAND Corp., Santa Monica, Calif.
SOME COMMENTS ON PROGRAM BUDGETING IN THE DEPARTMENT OF DEFENSE,
by G. H. Fisher. Mar 63, 10p. incl. illus.
(Rept. no. P-2721)
Unclassified report

Presented to the Program Budgeting Panel at the Joint Study Group on Military Resource Allocation Methodology meeting held at the Research Analysis Corporation, March 6, 1963.

DESCRIPTORS: *Federal budgets, Armed Forces budgets, Management engineering, Symposia, Department of Defense.

AD-402 287 Div. 32, 20
(TISTB/AW) OTS price $2.60

RAND Corp., Santa Monica, Calif.
BRITISH-AMERICAN COLLABORATION ON THE A-BOMB IN WORLD WAR II,
by H. A. DeWeerd. Feb 63, 29p. 51 refs. (Rept. no. P-2707)
Unclassified report

DESCRIPTORS: *Nuclear bombs, *Nuclear weapons, Uranium, Gaseous diffusion separation, Foreign policy, Design, Production, Research program administration, Scientific research.

AD-402 289 Div. 32
(TISTB/AW) OTS price $2.60

RAND Corp., Santa Monica, Calif.
NUCLEAR CONTROL AFTER NASSAU,
by Malcolm W. Hoag. Apr 63, 22p. 2 refs.
(Rept. no. P-2733)
Unclassified report

DESCRIPTORS: *Nuclear weapons, *Political science, Control, Distribution, Foreign policy.

Contents:
Post-Nassau problems
Multilateral purpose and interdependence
Force control
  Control requirements
  A control proposal
  Operational implications
  Criteria for release
Voting control

AD-402 433 Div. 32
(TISTB/MS) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ECONOMICAL EFFECTIVENESS OF GROUP MACHINING METHODS,
by A. Ya. Bel'chenko and G. G. Yatsenko.
25 Mar 63, 11p. incl. table (Trans. no. FTD-TT-63-47 from Gruppovyye Metody Obrabotki Detaley Mashin, Moskva, Mashgiz, pp. 172-179, 1961)
Unclassified report

DESCRIPTORS: *Economics, *Machine shop practices, Manufacturing methods, Industrial production, Measurement, Test methods, Effectiveness.

33. TRANSPORTATION

AD-401 156 Div. 33, 1, 18
(TISTA/VGW) OTS price $4.60

Federal Aviation Agency, Washington, D. C.
MILITARY CROSS-COUNTRY FLIGHT ACTIVITY. TYPICAL BUSY DAY.
Memo. rept.,
by Richard G. Brown. Feb 63, 43p. incl. illus. tables.
(Proj. 150-2S)

Unclassified report

DESCRIPTORS: *Air traffic, *Air transportation, Armed forces operations, Flight paths, Scheduling, Distribution, Tables, Management engineering, Air force operations, Army operations.

A previous survey of military cross-country flight activity prepared by the Traffic and Economic Analysis Area in 1958 is updated from flight plans submitted for three peak days in FY 1961 by the Military Flight Service Centers. All peak days assembled into a typical busy day fell on a Friday. Military cross-country flying as used in this report includes point-to-point and round-robin flights. Point-to-point flights depart one airfield and arrive at another. Round-robin flights leave the area defined as local, usually a radius of 100 miles, and return to the departure airfield without an intermediate stop of more than fifteen minutes for the purpose of discharging passengers. Also included are local flights which have filed an IFR flight plan. Those portions of the report indicating flight activity pictorially were prepared on the Cartographatron, an electronic machine which displays data feed-in thru a cathode ray tube used in combination with photographic emulsion. The information presented in this report, together with data pertaining to military local, general aviation, and air carrier activity, is used to determine traffic activity estimates. (Author)

AD-401 889 Div. 33, 13, 18
(TISTE/OHD) OTS price $26.00

Army Engineer Research and Development Labs., Fort Belvoir, Va.
TANKER UNLOADING FACILITIES TEST REPORT,
by Clair G. Weiss. 18 Oct 62, 528p. incl. illus. tables, 15 refs. (Technical rept. no. 1726-TR)

Unclassified report

DESCRIPTORS: *Handling, *Logistics, *Tankers, *Pipes, Supply depots, Cargo, Material control, Piers, Construction, Feasibility studies, Personnel, Surveying, Tests, Petroleum, Harbors, Mooring.

This report covers the background, design, and testing of various items of equipment which will ultimately become part of a submarine pipeline construction equipment set. Further, it reports the results of testing two basic methods of launching a submarine pipeline and two methods of installing tanker moorings. The troop efforts required to complete a tanker unloading facility are described and evaluated. The report concludes that: (a) Troops are capable of rapidly constructing a tanker unloading facility provided that they have sufficient training, the proper items of specialized equipment, and a well-supervised plan for accomplishment; (b) the Engineer Port Construction Company as now constituted needs supplementary men and equipment to perform its mission in constructing a tanker unloading facility; and (c) the offshore pulling method of launching a submarine pipeline since it offers the wider range of application and allows the best control of the launching operation. (Author)

AD-402 304 Div. 33
(TISTM/LMH) OTS price $1.75

Army Engineer Waterways Experiment Station, Vicksburg, Miss.
SOIL STABILIZATION. INVESTIGATIONS OF QUICKLIME AS A STABILIZING MATERIAL,
by G. R. Kozan and W. B. Fenwick. Mar 62, 60p. incl. illus. tables (Technical rept. no. 3-455; Rept. no. 5)
(Proj. 8S70-05-001)

Unclassified report

DESCRIPTORS: *Soils, *Clay, Phosphorus compounds, Oxides, Trafficability, Additives, Silicates, Sodium compounds, Fluorides, Stabilization.

The military needs a material capable of stabilizing weak soils sufficiently to support traffic for specific emergency operations. Based on encouraging results of earlier work with quicklime in stabilization of extremely wet and untrafficable soils, a laboratory and field investigation was conducted to determine its potential in the stabilization of soils of moderate initial water content and stability. Preliminary laboratory tests showed that as little as 4% quicklime by soil weight was capable of increasing the unconfined compressive strength of a lean clay soil (Vicksburg loess) from an initial 20 psi to over 100 psi, and its bearing capacity from a CBR of 4 to over 50 within 24 hr after treatment, thus exceeding the minimum laboratory strength criteria established for the emergency military road and airfield stabilization category. It was determined, however, that the effectiveness of quicklime is dependent upon initial soil water content and that, in the absence of sufficient water for hydration, the quicklime may be detrimental to the soil. (Author)

NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

*Descriptors marked with an asterik are included in the subject index.

ASTRONOMY

NASA N63-13795 OTS $0.50

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
A DETECTOR FOR LOW ENERGY GAMMA-RAY ASTRONOMY EXPERIMENTS, by K. J. Frost and E. D. Rothe, Mar 63, 10p. 12 refs. Technical note D-1693.

Astrophysics

NASA N63-14806 OTS $1.00

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
SOME POSSIBILITIES FOR DETERMINING THE CHARACTERISTICS OF THE ATMOSPHERES OF MARS AND VENUS FROM GAS-DYNAMIC BEHAVIOR OF A PROBE VEHICLE, by Alvin Seiff. Apr 63, 36p. 12 refs. Technical note D-1770.

NASA N63-14587 OTS $1.00

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
SPRAY EJECTED FROM THE LUNAR SURFACE BY METEOROID IMPACT, by Eugene M. Shoemaker, Henry J. Moore, and Donald E. Gault, Apr 63, 39p. 44 refs. Technical note D-1767.

NASA N63-13714 OTS $0.50

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
REMARKS ON HILL'S LUNAR THEORY. PART II, by Karl Stumpff, Mar 63, 15p. 2 refs. Technical note D-1541.

NASA N63-13713 OTS $0.50

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
REMARKS ON HILL'S LUNAR THEORY. Part 1, by Karl Stumpff, Mar 63, 16p. 2 refs. Technical note D-1540.

NASA N63-14428 OTS $0.50

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
RESULTS OF MICROMETEORITE PENETRATION EXPERIMENT ON THE EXPLORER VII SATELLITE (1959 IOTA) by H. E. LaGow and L. Secretan, Apr. 63, 9p. 5 refs. Technical note D-1722.

NASA N63-13104 OTS $0.50

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
THE SOUTHERN SKY SURVEY PAYLOAD, by Richard M. Windsor. Feb 63, 17p. 7 refs. Technical note D-1719.

NASA N63-13220 OTS $0.50

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
A VACUUM ULTRAVIOLET PHOTOIONIZATION DETECTOR, by A. K. Stober, R. Scolnik, and J. P. Hennes, Mar 63, 11p. 15 refs. Technical note D-1715.

NASA N63-14406 OTS $2.75

Stanford Research Inst., Menlo Park, Calif.
EVALUATION OF INFRARED SPECTROPHOTOMETRY FOR COMPOSITIONAL ANALYSIS OF LUNAR AND PLANETARY SOILS, by R. J. P. Lyon, Rept. on Contract NASr-49(04). Apr 63, 136p. 43 refs. NASA Technical note D-1871.

BEHAVIORAL SCIENCES

TID-7638 OTS $2.75

Oak Ridge National Lab., Tenn.
CONFERENCE ON PROGRESS IN NUCLEAR EDUCATION, GATLINBURG, TENNESSEE, AUGUST 20-22, 1962. (Prepared in Cooperation with American Nuclear Society, Oak Ridge, Tenn.). 192p. 30 refs.

NASA N63-15241 OTS $1.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
A SIMPLIFIED METHOD FOR MEASURING HUMAN TRANSFER FUNCTIONS, by James J. Adams, Apr 63, 37p. 10 refs. Technical note D-1782.

Psychology

AD-282 429 OTS $13.00

Harvard U., Graduate School of Education, Cambridge, Mass.
DIFFERENTIATION AND INTEGRATION ON CAREER DEVELOPMENT, by David V. Tiedeman and Robert P. O'Hara (Boston Coll.). Rept. on Harvard Studies in Career Development no. 23 [Contract Nonr-1866(31)]. Feb 62, 189p. 108 refs.

DESCRIPTORS: *Personality, *Vocational tests, Theory, Synthesis, Analysis, Selection, Students

Career development is conceived as the process of fashioning a vocational identity through differentiation and integration of the personality as one confronts the problem of work in living. Some of the research in career development is summarized. Although the research is considered in a broad way, it is not exhaustively considered. The review offers a general summary of research completed and generally published as a part of the series entitled 'Harvard Studies in Career Development, a review not previously available. (Author)

PB 163 068 OTS $3.60

Institute of Group Relations, U. of Oklahoma, Norman.
VARIETIES OF SOCIAL STIMULUS SITUATIONS, by Muzafer Sherif and Carolyn W. Sherif. 1961, 36p. 18 refs.

DESCRIPTORS: Sociology, Communications theory, Stimulation, Reaction (Psychology), *Behavior, Motivation, Ecology, Culture, Attitudes, Leadership, *Group dynamics, Psychometrics

Paper presented to Symposium on Dimensions of Stimulus Situations Accounting for Behavior Variance; Texas Christian University, Fort Worth, April 21, 1961.

AD-279 198 OTS $3.60

Interaction Lab., Yale U., New Haven, Conn.
A DECISION PROCEDURE FOR THE SYSTEM E_1 OF ENTAILMENT WITH NEGATIVE, by Nuel D. Belnap, Jr. and John R. Wallace. Technical rept. no. 11 on Problem Solving and Social Interaction, Contract SAR/Nonr-609(16). Nov 61, 36p. 6 refs.

DESCRIPTORS: *Reasoning, Sociology, Behavior, Mathematical logic, Theory, *Decision making, Topology

This report represents a continuation of studies of the logical relation of entailment, which is offered, in part, as an analysis of the concept of relevance. We remark that the relation of entailment is virtually the only logical relation offering any hope of developing a theory of relevance in purely formal and logical terms. In particular, we deal with that fragment of the theory of entailment which involves, besides entailment itself, only the concept of negation. The principle ojbect of this report is to show that this fragment is decideable; i. e., that there is an algorithm for determining whether an arbitrary candidate is or is not a theorem of the fragment in question. The chief technique involved in demonstrating this result is the employment of Gentzen sequenzen-kalkülen, a variety of logical systems closely related, both historically and systematically, with the systems of natural deduction. (Author) (See also PB 162 875)

PB 163 074 OTS $1.60

Johns Hopkins U. [Baltimore, Md.]
INTERACTIONS OF TROPICAL ENVIRONMENTS AND HUMAN PERFORMANCE, by Douglas H. K. Lee. Rept. on Contract W44-109-qm-2048. Mar 49, 11p. QMREC Environmental Protection Section rept. no. 154.

DESCRIPTORS: *Tropical regions, *Physiology, Psychology, Man, *Military personnel, Climatic factors, *Desert tests.

The purpose of the plan is to set out, in as logical a fashion as possible: (I) the various items in tropical environments which may affect man; (II) the mode of their action upon the human body; (III) the physiological processes in man affected by them; (IV) the way in which these processes operate upon human efficiency. Special environmental items created by military circumstances have been included; but for the rest, the plan is applicable to civilian circumstances equally well as to military. The term "tropical", as used here, includes the desert or dry climates as well as the humid ones.

AD-267 818 OTS $15.00

Personnel Research Board, Ohio State U., Columbus.
ORIGINALITY IN GROUP PRODUCTIVITY. IV. STUDIES OF THE EFFECTS OF SPONSORSHIP AND STRATEGY UPON THE ACTOR'S INDEPENDENCE AND UPON THE SOCIAL ASSESSMENT OF HIS PRODUCTIVITY, by Pauline N. Pepinsky, Richard J. Campbell and others. Rept. on Contract Nonr-495(15). 1961, 230p. 19 refs.

DESCRIPTORS: *Group dynamics, Production, Inventions, *Social communication, Tests

This report describes two pairs of experiments designed to test the sponsor and strategy hypotheses. The results show the expected effect of sponsorship in increasing the variability of the responses of unselected subjects (Ss). Contrary to prediction, the sponsored Ss more frequently emerged as the most highly valued members of their groups. It is proposed as a plausible explanation that the sponsor's appeal had this indirect effect, as a consequence of its motivational properties, and because it provided a concomitant reduction in stimulus ambiquity for the sponsored S, just as his own response, in turn, served the same function for the other Ss who witnessed his behavior. The strategy hypothesis was supported: good strategy produced significantly higher assessments of the actor's productivity than poor strategy. This effect occurred despite the fact that the two sets of actors were not differentiated in either their task ability or in perceived amount of talk. The good strategists were correctly viewed as the more apt to modify initial judgments, but that characteristic was generally unrelated to favorable over-all assessment. (Author)

BIOLOGICAL SCIENCES

BNL-738 OTS $3.50

Brookhaven National Lab., Upton, N. Y.
ENZYME MODELS AND ENZYME STRUCTURE. Rept. of Symposium held June 4-6, 1962. Brookhaven Symposia in Biology no. 15. Dec 62, 344p. 664 refs. C-34.

PB 163 089 OTS $1.10

Naval School of Aviation Medicine, Pensacola, Fla.
GENTLING AND ALTITUDE TOLERANCE, by N. E. Phillips and R. G. Bartlett, Jr. 28 Apr 60, 8p. 3 refs. Proj. MR005.15-2001, rept. no. 3; AD-243504.

DESCRIPTORS: *Tolerances (Physiology), Rats, High altitude, *Adjustment (Psychology), *Stress (Physiology), Stress (Psychology), Pressure, Survival, Atmosphere, Handling

An attempt was made to determine whether adult animals can be gentled and whether such gentling improves their tolerance to physical restraint and low atmospheric pressure. Adult albino rats (Wistar strain) were gentled by being handled individually by the experimenter for about seven minutes a day over a three-week period. On the day after the end of this period the animals were subjected to a simulated altitude of 33,500 feet. Gentling neither improved nor reduced their ability to withstand this exposure when compared with controls. Physical restraint by confining to a small wire cage also was employed as an additional stress, and this reduced the ability of the animals to withstand altitude in both the gentled and the nongentled groups. (Author)

Medical Specialties and Equipment

PB 163 140 OTS $2.60

[Army Chemical Research and Development Labs.]
Army Chemical Center, Md.
THE MEDICAL LABORATORIES RAT PILOT COLONY, by E. LeB. Gray and Joseph W. Derum. May 55, 25p. 5 refs. Medical Labs. Research rept. no. 365.

DESCRIPTORS: *Medical laboratories, *Rats, Reproduction (Physiology), *Laboratory animals, Diseases, Growth, Genetics, Ecology, Infections.

To fill a need for healthy animals from a single, known source, the Animal Ecology Branch established a rat pilot colony in May 1952. By controlling the rats' environment, by applying certain principles of genetics, and by insisting on stringent hygienic and contact practices, the Branch sought to establish a small nucleus of animals which would be essentially free from pulmonary and parasitic disorders. By March 1954, post weaning deaths dropped from 15.8% to 0.0%, pneumonic infections from a high of 60% to about 12%, and parasitic infections were no longer detectable. The "spinner" rat became a rarity. A production colony eventually supplanted the pilot colony so rat production could be increased fivefold. Improved control and record keeping methods prevented the accumulation of surplus animals, and better management techniques indicated that rats raised in the Animal Ecology Branch, Medical Laboratories, cost only about two-thirds as much as those purchased from commercial dealers. A planned personnel training program, coincident with the establishment and maintenance of the pilot colony, significantly increased the efficiency of the animal technicians. (Author)

PB 163 110 OTS $1.60

Army Chemical Research and Development Labs.,
Army Chemical Center, Md.
TEST OF MOUTH-TO-MASK RESUSCITATION APPARATUS, by Duncan A. Holaday. Sep 54, 20p. Special rept. MLSR no. 53.

DESCRIPTORS: Mouth, *Breathing masks, Arteries, *Artificial respiration, Oxygen, Carbon dioxide, Ventilation, Blood, Statistical data

An attempt was made to determine whether mouth-to-mask insufflation maintains arterial blood oxygen saturations and carbon dioxide tensions within satisfactory ranges in subjects who are apneic or whose ventilation is inadequate.

Radiobiology

TID-17762 OTS $0.75

Atomic Energy Commission. Div. of Biology and Medicine, Washington, D. C.
RADIONUCLIDES AND IONIZING RADIATION IN ORNITHOLOGY: A SELECTED BIBLIOGRAPHY ON WILD AND DOMESTIC BIRDS, by Vincent Schultz. Feb 63, 28p. 328 refs.

PB 163 146 OTS $2.60

Naval Radiological Defense Lab., San Francisco, Calif.
RADIOTOXICITY RESULTING FROM EXPOSURE TO FALLOUT SIMULANT. II. THE METABOLISM OF AN INHALED AND INGESTED SIMULANT OF FALLOUT PRODUCED BY A LAND-BASED NUCLEAR DETONATION, by S. H. Cohn, W. B. Lane and others. 11 Jan 57, 25p. 7 refs. Research and development technical rept. USNRDL-TR-118.

DESCRIPTORS: *Radiation effects, Toxicity, Metabolism, Respiration, Mice, Gastrointestinal system, Particles, *Nuclear explosions, *Radioactive fallout, Aerosols, Absorption, Tissues (Biology), *Radiological dosage, *Radiation hazards.

The present study was designed to reproduce in the laboratory an acute exposure of mice to early fallout (2 days old) such as might result from a land-based nuclear detonation. Biological data were obtained on the uptake, distribution, and retention of the inhaled fallout simulant. Further, as a basis for comparing the effects of different types of simulants, the metabolic behavior of this dry-particle fallout simulant of limited solubility was compared to that of two previously studied fallout simulants; an ionic liquid aerosol and a mud-slurry aerosol. The simulant was also administered by gavage to provide data on uptake of fallout by ingestion as compared with inhalation. From these data, an evaluation was made of the radiation dose to individual tissues from inhaled fallout as compared to the concomitant external radiation dose that the animals would receive if exposed to the same airborne simulant. (Author)

OTS SB-511 $0.10

Office of Technical Services, Dept. of Commerce, Washington, D. C.
RADIOPROTECTIVE AGENTS. Feb 63, 9p. 94 refs. OTS Selective Bibliography SB-511.

DESCRIPTORS: *Radioprotective agents, *Bibliography, *Drugs, *Antibiotics, Chemicals, *Diet, Nutrition, Anesthesia, Radiation effects.

Lists 94 domestic and foreign references on radioprotective (anti-radiation) agents added to the OTS collection through February 1963. Includes reports on: drugs, i.e., cysteamine, mercamine, AET, tsigerol, insulin, guanadine, etc.; antibiotics, i.e., streptomycin; chemicals, among them Tsiin- derived from common tea fungus; diet and nutrition supplement - alfalfa or broccoli; and, narcosis. (Author)

UR-607 OTS $1.10

Rochester U. School of Medicine and Dentistry, N. Y.
LIQUID SCINTILLATION COUNTING OF PLUTONIUM-239 FROM BIOLOGICAL SAMPLES, by Taft Y. Toribara, Donald A. Morken, and Carol Predmore. Rept. on Contract W7405-eng-49. 23 Jan 62, 8p. 5 refs.

CHEMISTRY

IDO-11001 OTS $0.50

Monsanto Research Corp., Dayton, Ohio.
ORGANIC COOLANT ESSENTIAL DATA FOURTH QUARTERLY REPORT, JANUARY 1-MARCH 30, by J. A. Ellard, C. D. King and others. Rept. on Contract AT(10-1)1088. 6 Apr 62, 15p. 10 refs.

AD-266 292 OTS $1.10

Stanley-Thompson Lab., Columbia U., New York.
EVALUATION OF BOUNDARY LAYER THICKNESS IN ELECTROLYTIC SYSTEMS FROM DECAY OF ANODE CONCENTRATION POLARIZATION, by Jack H. Schulman and Leonard Nanis. Rept. on Contract Nonr-266(64). 30 Oct 61, 8p. 1 ref.

DESCRIPTORS: *Electrolysis, Electrodes, Anodes, Boundary layer, Ions, Electrolytes, Solutions, Diffusion

Analytical Chemistry

LA-2844 OTS $0.50

Los Alamos Scientific Lab., N. Mex.
THE SPECTROPHOTOMETRIC DETERMINATION OF URANIUM IN MIXTURES OF URANIUM AND TUNGSTEN, by A. D. Hues and A. L. Henicksman. Rept. on Contract W7405-eng-36. Nov 62, 10p. 3 refs. NASA N63-14529.

DP-619 OTS $0.50

Savannah River Lab., Aiken, S. C.
ANALYTICAL METHOD FOR IN-LINE PLUTONIUM ANALYSES, by Robert F. Overman. Rept. on Contract AT(07-2)1. Aug 61, 9p. 8 refs.

EARTH SCIENCES

PB 163 124 OTS $21.00

Massachusetts Inst. of Tech., Cambridge.
CONTAINED NUMERICAL STUDIES ON UNDERGROUND NUCLEAR DETECTION AND FURTHER DIGITIZED SEISMIC DATA, by S. M. Simpson, Jr. Scientific rept. no. 3 on Project Velva-Uniform, Contract AF 19(604)7378. 30 June 62, 385p. 11 refs. AFCRL 62-879; ARPA Order no. 180-61.

DESCRIPTORS: *Nuclear explosions, *Underground explosions, Detection, *Seismic waves, Spectrographic analysis, Signal-to-noise ratio, *Data processing systems, *Digital systems, Data storage systems, Magnetic tapes, *Programming (Computers), Indexes

Twenty-three records from the Logan and Blanca Series were digitized at 1/20 sec. increments, approximately 3000 points each, making a total of 117 records available at present. Theoretical treatment of spectral analysis was used to elaborate on linear processes and on the Daniell and modified Daniell spectral estimation techniques. These techniques were used in an auto spectral study involving practically all available seismic records. Intercomponent and interstation cross-spectral and coherency computations on seismic noise were performed, aimed at wave type identification. In another study a set of first motion wavelets was extracted from the bomb records. For these wavelets, cross-correlations, spectra, travel time curves, and variable density plots were prepared. Filtering experiments with prediction operators, Wiener optimum filters, and wavelet contractors yield generally encouraging results with signal-to-noise ratio power improvements up to 20:1, and experiments with least-squares inverses show them to be relatively insensitive to shifts in digitization origin. Computer programming was continued with documentation now supplemented by the use of a Key-Work-In-Context (KWIC) index. (See also AD-273 114)

PB 163 038 OTS $12.50

Research and Advanced Development Div., Avco Corp., Wilmington, Mass.
MAGNETIC ACTIVITY IN THE ANTARCTIC DURING THE INTERNATIONAL GEOPHYSICAL YEAR AND THE INTERNATIONAL GEOPHYSICAL COOPERATION, by Gerald F. Rourke. Scientific rept. no. 1 on Antarctic Research and Data Analysis, Contract NSF-C255. 22 Apr 63, 167p. 44 refs. Technical rept. RAD-TR-63-2.

DESCRIPTORS: *Geophysics, *Antarctic regions, Magnetism, *Terrestrial magnetism, *Magnetic storms, Diurnal variations, Periodic variations, Harmonic analysis.

Based on a study of the K index at 13 Antarctic magnetic observatories, the geographic distribution of magnetic activity is examined. Latitudinal variations in activity are best described as a function of distance from the auroral zone rather than geomagnetic or geographic coordinates. Seasonal movements of the auroral zone width change the relative position of the Stagg transition zone. Winter and summer maxima in magnetic activity are dependent on geomagnetic time, occurring at geomagnetic noon and midnight. Studies of locally selected quiet and disturbed days versus international quiet and disturbed days indicate a seasonal dependence on (a) the S_q current system, and (b) the latitudinal change in the degree of magnetic activity from winter to summer. During international quiet periods, inner auroral zone perturbations are evident which are worldwide in nature. On locally disturbed days, K indices for inner auroral zone and auroral zone stations have a low correlation with K_p while outer auroral zone stations are highly correlated. Daily sums of K indicate an inner maximum of activity at Vostok. Causes for the above phenomena are discussed. (Author)

Climatology and Meteorology

PB 163 031 OTS $11.00

Aerometric Research, Inc., Goleta, Calif.
U. S. ANTARCTIC SERVICE EXPEDITION 1939-41. EAST BASE METEOROLOGICAL SUMMARY, comp. by Herbert G. Dorsey, Jr. Rept. on Contract NSF C194. [1962] 142p.

DESCRIPTORS: *Antarctic regions, Weather stations, *Meteorological data, Meteorological instruments, Atmospheric precipitation, Tides, Atmospheric temperature, Barometric pressure, Humidity, Visibility, Wind, Tables.

East Base was in an area still relatively unknown from a geographical point of view. The leader of the base as well as many of the personnel were primarily interested in reconnaissance type of investigations, leading to new geographical knowledge as well as complete a survey of other scientific aspects as could be made for an area which the United States was exploring for the first time. Therefore, the meteorological program at East Base was on an operational basis, in direct support of these geographical exploratory aims.

NASA N63-14586 OTS $0.50

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
A RADIATION VIEW OF HURRICANE ANNA FROM THE TIROS III METEOROLOGICAL SATELLITE, by W. R. Bandeen, B. J. Conrath and others. Apr 63, 18p. 7 refs. Presented at the Intern. Symp. on Rocket and Satellite Meteorology, Washington, Apr 23-25, 1962. Technical note D-1713.

PB 163 098 OTS $6.60

Marine Lab., U. of Miami, Coral Gables, Fla.
INVESTIGATION OF RAINFALL MEASUREMENT BY RADAR, by H. W. Hiser and L. F. Conover. Final rept., 1 Aug 55-1 Aug 56, on Contract Cwb-8614. Sep 56, 66p. 3 refs. Rept. no. 56-22; ML-13931; AD-120 066.

DESCRIPTORS: *Rainfall, Atmospheric precipitation, *Radar equipment, Radar, Radar repeaters, Radar recording cameras, Densimeters, *Photographs, *Photographic recording media, Data, *Correlation techniques, Statistical analysis, Measurement, *Meteorological radar.

The purpose of this investigation was to develop techniques for estimation of rainfall with radar through the use of integrated radarscope photographs. The integrations are accomplished by continuously exposing the photographic material to the radarscope for periods of from one to six hours. The integrated photographs are evaluated with a densitometer. The equipment, methods, and materials used for preparing and evaluating the integrated photographs are described briefly.

PB 163 099 OTS $8.60

Marine Lab., U. of Miami, Coral Gables, Fla.
INVESTIGATION OF RAINFALL MEASUREMENT BY RADAR, by H. W. Hiser, L. F. Conover, and H. V. Senn. Final rept., 1 Aug 56-30 June 57, on Contract Cwb-9012. June 57, 92p. 9 refs. Rept. no. 57-12; AD-135 150.

DESCRIPTORS: *Rainfall, Atmospheric precipitation, *Radar equipment, Radar, Radar repeaters, *Radar recording cameras, Densimeters, *Meteorological radar, Detection, Photographic film, *Photographic processors, Exposure, Sensitivity, *Correlation techniques, Nomographs, *Storms, Echo ranging, Cameras, Measurement, Photographic analysis.

Techniques were developed for the estimation of rainfall with radar by integrated radarscope photographs. The integrations are accomplished by continuously exposing the photographic material to the radarscope for 1 to 6 hr. The photographs are evaluated with a densitometer, and the echo densities are compared with available raingage readings. Both transmission type A (Tran A) and fine grain positive (FGP) films respond to the law of reciprocity. The intermittency effect was relatively unimportant in the photointegration process. Multiple layering of films may provide a technique to obtain approximate contours of areas of heaviest precipitation. Limited investigations were completed on the point or areal method of the integration problem. Better understanding is provided of the radar and film sensitometric relationships which should prove of value in the interpretation of photointegrations and development of evaluation techniques.

ORO-199 OTS $1.50

Weather Bureau, Oak Ridge, Tenn.
SUPPLEMENTARY METEOROLOGICAL DATA FOR OAK RIDGE, by William F. Hilsmeier. 15 Mar 63, 57p. 3 refs.

Geology

PB 163 028 OTS $6.60

Geophysical and Polar Research Center, U. of Wisconsin, Madison.
SUMMARY AND DISCUSSION OF THE GLACIOLOGICAL WORK IN THE FILCHNER ICE SHELF AREA OF ANTARCTICA, by John C. Behrendt. Apr 62, 69p. 42 refs. Research rept. no. 62-3.

DESCRIPTORS: *Antarctic regions, Geophysical prospecting, *Glaciers, *Ice, Thickness, Determination, Gravity, Seismic waves, Tables

Geophysical and glaciological data collected during the IGY in the Filchner ice shelf area have been reported previously, and some of these are included here to present a more unified picture of the region. A large trough underlies the eastern section of the ice shelf and extends into the unexplored area at its head. Although the trough is not isostatically compensated locally, the area as a whole is essentially in isostatic equilibrium.

The elevation of the M discontinuity is about -31 km, which is consistent with that expected for a continental margin. Berkner island is a grounded ice feature on Berkner bank, which gravity data indicate is probably composed of morainal material. The eastern section of the shelf is flowing seaward at a high rate, and the amount of ice lost at the ice front is greater than accumulation on the shelf. (Author)

PB 163 025 OTS $5.60

Institute of Polar Studies, Ohio State U., Research Foundation, Columbus.
GLACIOLOGICAL STUDIES ON THE McMURDO-SOUTH POLE TRAVERSE, 1960-1961, by Mario B. Giovinetto. Rept. on NSF Grant G13502. Jan 63, 60p. 42 refs. IPS rept. no. 7; RF Proj. 1128.

DESCRIPTORS: *Antarctic regions, Terrain, Climate, *Glaciers, *Stratigraphy, *Atmospheric precipitation, *Ice, Thickness, Hardness, Density, Atmospheric motion

Studies of snow stratigraphy indicate that the mass accumulation between Victoria Land Plateau (78° 02' S, 154° 22' E) and the South Pole is approximately 4.5 g. $cm^{-2} yr^{-1}$ (± 20%), which is one-half the amount determined previously for the same region. The rate of mass accumulation decreases from south to north, a trend opposite to that reported in the literature. This can be explained in terms of the known pattern of atmospheric circulation and topography. (Author)

PB 163 026 OTS $9.10

Institute of Polar Studies, Ohio State U., Research Foundation, Columbus.
A PRELIMINARY REPORT ON PLANT REMAINS AND COAL OF THE SEDIMENTARY SECTION IN THE CENTRAL RANGE OF THE HORLICK MOUNTAINS, ANTARCTIC, by James M. Schopf (Geological Survey). Rept. on NSF Grant G13590. Feb 62, 101p. 99 refs. IPS rept. no. 2; RF Proj. 1132.

DESCRIPTORS: *Antarctic regions, Mountains, Sedimentary rocks, *Coal, Deposits, Petrology, *Paleoecology, *Plants (Biology), Pollen, Spores, Seeds, Wood, Cells (Biology)

The sedimentary section of the central range of the Horlick Mountains includes coal and carbonaceous sediments with a variety of plant fossils. These have been studied to provide information about (1) age of the deposits, (2) coal composition and metamorphism, and (3) general geologic inferences that may be based on the occurrence of coal and fossil plants five degrees from the South Pole. More than 20 types of spore and pollen microfossils have been described briefly. Fragments of fusinized wood are abundant and aid in characterization of the floral assemblage and sedimentary facies. Fossil wood is described in detail for evidence it provides about conditions of growth, woody degradation, and diagenetic mineralization. The wood shows thick annual growth rings which attest to the periodicity of climate and to favorable growth conditions. Fossil leaves and seeds provide further evidence of the nature of the flora and basis for general age determination. Coal has been chemically analyzed and is of semianthracitic rank. Studies of thin and surface sections of coal show features most similar to those of the bituminous coal deposits of Australia, India, and Africa. No evidence is in conflict with Permian age assignment for the Horlick Mountains coal measures deposits, but further study is needed to provide a more detailed basis for correlation. (Author)

Oceanography

AD-295 191 OTS $14.00

Oceanographic Inst., Florida State U., Tallahassee.
OCEANIC TURBULENCE (REVIEW), by Takashi Ichiyo. Technical paper no. 2 on Contract Nonr-988(11). Oct 62, 205p. 230 refs.

DESCRIPTORS: *Oceans, *Turbulence, Turbulent boundary layer, Ocean waves, Tides, Sedimentation, Underwater sound, Diffusion, Stability, Statistical analysis

Contents:
Mixing length theory
Planetary boundary layers
Application of mixing length theory to shallow water
Eddy viscosity and storm surges
Surface waves and turbulence in the ocean
Effect of stability
Empirical determination of vertical eddy viscosity in the ocean
Spectral analysis of oceanic turbulence
Horizontal turbulence in large scale motion
Turbulent diffusion: Approximate analysis of one- and two- particle problems
Turbulent diffusion as a stochastic phenomena
Hydrodynamic approach to turbulent diffusion
Diffusion theory of tidal flushing
Turbulence and sediment transportation
Sound transmission in a turbulent medium

PB 163 029 OTS $8.60

Sedimentological Research Lab., Florida State U., Tallahassee.
SEDIMENTOLOGY OF ANTARCTIC BOTTOM SEDIMENTS: DEEP FREEZE FOUR, by H. G. Goodell, W. M. McKnight and others. Progress rept. [1962] 98p. 235 refs.

DESCRIPTORS: *Antarctic regions, *Marine geology, *Ocean bottom sampling, *Sedimentation, Stratigraphy, Minerals, *Geochemistry, *Paleoecology, *Foraminifera, Bibliography, Tables

The studies being conducted cover textural and mineralogical data, microfaunal studies, geochemical and geochronological investigations.

PB 163 024 OTS $7.60

Texas A. & M. Research Foundation, College Station.
CALCIUM CARBONATE SATURATION LEVEL OF THE OCEAN FROM LATITUDES OF NORTH AMERICA TO ANARCTICA AND OTHER CHEMICAL OCEANOGRAPHIC STUDIES DURING CRUISE III OF THE USNS ELTANIN BETWEEN PANAMA CITY, PANAMA, AND VALPARAISO, CHILE, FROM 1-26 JUNE 1962, by Donald W. Hood, David Berkshire and others. Rept. on NSF Grant G18477. 5 Jan 63, 76p. 5 refs. Reference no. 63-3D.

DESCRIPTORS: *Pacific Ocean, Central America, South America, *Oceanographic data, *Sea water, Salinity, *Calcium compounds, Carbonates, *Carbon dioxide, Metals, Temperature, Density, Hydrogen ion concentration, Tables.

The primary objectives of this investigation were to study in detail the level of calcium carbonate saturation of Pacific Ocean water from the Tropics to Valparaiso, Chile; to determine, on a continuous basis, the molecular carbon dioxide content of surface water and the atmosphere: to collect samples for trace metal analysis with particular reference to copper, manganese, and zinc; to collect samples for lipid analysis with particular reference to the fatty acid fractions: and to determine, where possible, the transfer rates of carbon dioxide between the sea and atmosphere. To accomplish these objectives it was necessary to occupy a group of stations in a north to south direction at about 5^{o} intervals and to obtain collateral information including temperature, salinity, dissolved oxygen, alkalinity, and pH at a sufficient number of depths to fully define the oceanographic system from which the samples analyzed were obtained. (Author)

Physics of the Atmosphere

NASA N63-14027 OTS $0.50

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
ELECTRON DENSITY DISTRIBUTION IN THE UPPER F-REGION, by S. Chandra, Mar 63, 12p. 16 refs. Technical note D-1751.

NASA N63-13722 OTS $0.50

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
ENERGY SPECTRUM OF ELECTRONS IN THE OUTER RADIATION BELT. by Wilmot N. Hess and John A. Poirier. Mar 63, 18p. 27 refs. Technical note D-1717.

NASA N63-13838 OTS $0.50

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
FIRST TOPSIDE SOUNDINGS OF THE IONOSPHERE, by J. E. Jackson, R. W. Knecht (Natl. Bur. of Standards), and S. Russell (Airborne Instruments Lab.). Mar 63, 18p. 6 refs. Technical note D-1538.

NASA N63-13719 OTS $0.50

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
NOTE ON THE THICKNESS OF THE HELIUM ION LAYER, by S. J. Bauer, Mar 63, 7p. 18 refs. Technical note D-1686.

NASA N63-13720 OTS $0.50

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
PRELIMINARY MEASUREMENTS OF TEMPERATURES AND WINDS ABOVE 50KM OVER WALLOPS ISLAND, VIRGINIA, by William Nordberg and Wendell Smith. Mar 63, 15p. 19 refs. Technical note D-1694.

NASA N63-14273 OTS $1.25

Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
WIND FLOW IN THE 80-400 KM ALTITUDE REGION OF THE ATMOSPHERE, by George C. Ragsdale and Peter E. Wasko, Mar 63, 40p. 54 refs. Technical note D-1573.

PB 163 095 OTS $1.10

McMath-Hulbert Observatory [Pontiac, Mich.]
INVESTIGATION OF THE SPECTRAL ENERGY DISTRIBUTION FROM CLOUDS AND BLUE SKY IN THE NEAR INFRARED, by Keith Pierce. Technical rept. no. 41 on Contract N6onr-[232] T.O. 5. Feb 53, 9p. 5 refs. AD-9553.

DESCRIPTORS: *Clouds, *Sky brightness, Spectrum analyzers, *Spectrographic analysis, *Infrared spectroscopy.

Comparative sky-and sunlight observations were made with a Perkin-Elmer Mod 12-C IR spectrometer having a CaF_2 prism and an uncooled Cashman-type PbS receiver. The instrument was attached to the tail piece of the F. C. McMath 24-in.-diam Cassegrain-type reflector. Sunlight was reflected from a white card and observed with low amplifier gain and the same slit widths as were used for the sky observations. The data followed very closely the Rayleigh law from 0.7 to 1.0μ, but from 1 to 1.6 μ they deviated strongly in the direction of a large solar component. The sky was not as black in the IR beyond 1 μ as was expected. Observation data showed that the energy distributed from cumulus, stratus, and dark clouds is essentially that of scattered sunlight except for a great additional absorption in the water-vapor bands at 0.8, 1.1, 1.8, and 2.0 μ in cumulus-type formations. A rough estimate of the intensity of cloud edges at 1 μ compared to blue sky gave a ratio between 50 and 200 to 1 which depended on the cloud type, mode of illumination, and distance in degrees from the sun.

PB 163 081 OTS $1.60

Oslo U. (Norway).
AN INVESTIGATION OF THE MICROSTRUCTURE OF THE PERTURBATIONS IN THE GEOMAGNETIC FIELD IN THE AURORAL ZONE, by Alv Egeland. Scientific rept. no. 4 on Contract AF 61(514)1123. 1959, 17p. 5 refs. AFCRC-TN-59-613; AD-232 272.

DESCRIPTORS: *Terrestrial magnetism, Microstructure, *Aurorae, Spectrographic analysis, Statistical analysis, Magnetic storms, Very low frequency, Electromagnetic waves, Sources, Whistlers.

An investigation was made of oscillations in the geomagnetic field occurring in the frequency range 2 - 7000c. The measurements were made in the auroral zone, in November 1957 and June-July 1958. The spectrum was recorded by 3 different methods: film, tape, and direct frequency recording. The records were analyzed by statistical methods, and the most important features of the magnetic spectra were found to be broad bands and some spectral lines. Two different mechanisms for generation of the observed spectra are discussed. (Author)

SC-4759(RR) OTS $0.50

Sandia Corp., Albuquerque, N. Mex.
THE DISTRIBUTION OF ABSORBED X-RAY ENERGY IN THE ATMOSPHERE, by Frank Biggs. Rept. on Contract AT(29-1)789. Feb 63, 16p. 5 refs. NASA N63-13577.

P3 163 030 OTS $9.60

Stanford Electronics Labs., Stanford U., Calif.
AN ATLAS OF SELECTED VLF SPECTRA FROM BYRD STATION, ANTARCTIC, by R. A. Helliwell, J. P. Katsufrakis and others. Rept. on National Science Foundation Grants NSF 9511, 13465, and 17217. 15 Mar 62, 114p. 11 refs. Rept. no. SEL-62-046; NASA N62-12140.

DESCRIPTORS: *Antarctic regions, *Ionosphere, Atmospherics, *Radiofrequency spectroscopy, Very low frequency, *Whistlers.

ENGINEERING

RFP-302 OTS $0.50

Dow Chemical Co., Denver, Colo.
PRELIMINARY TEST ON AXIAL SPINDLE EXPANSION OF NUMBER 739 EX-CELL-O NUMERICAL TAPE CONTROL MACHINE, by J. H. Krine. Rept. on Contract AT(29-1)1106. 19 Feb 63, 10p.

NP-11896 OTS $1.75

America Society of Civil Engineers, New York.
CIVIL ENGINEERING BIBLIOGRAPHY ON THE DESIGN AND CONSTRUCTION OF NUCLEAR FACILITIES, ed. by Richard J. Smith. Dec 62, 71p. 459 refs.

ANL-6674 OTS $0.75

Argonne National Lab., Ill.
REDUCTION OF VAPOR CARRYUNDER IN SIMULATED BOILING, by P. L. Miller and C. P. Armstrong. Rept. on Contract W31-109-eng-38. Feb 63, 30p. 1 ref. NASA N63-14563.

Aeronautical Engineering

NASA N63-12518 OTS $2.60

[Flight Research Center, National Aeronautics and Space Administration] Edwards, Calif.
IN-FLIGHT GAINS REALIZED BY MODIFYING A TWIN SIDE-INLET INDUCTION SYSTEM, by Edwin J. Saltzman. 12 Dec 57, declassified 1 Dec 62. 30p. 4 refs. Research memo. RM H57J09.

NASA N63-15056 OTS $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
AIRCRAFT VORTEX WAKES IN RELATION TO TERMINAL OPERATIONS, by Joseph W. Wetmore and John P. Reeder. Apr 63, 24p. 5 refs. Presented at the Symp. on Development of Analytical Models for Estimating Airport Capacity, Calif. U., Nov. 29-30, 1962. Technical note D-1777.

NASA N63-14274 OTS $0.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
ANALYSIS OF THE EFFECT OF ALTIMETER-SYSTEM ACCURACY ON COLLISION PROBABILITY, by William Gracey, Mar 63, 10p. 2 refs. Technical note D-1627.

NASA N63-15050 OTS $2.25

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
WING AND FLAP LOADS OBTAINED FROM A WIND-TUNNEL INVESTIGATION OF LARGE-SCALE V/STOL MODEL, by Robert J. Huston, John F. Ward, and Matthew M. Winston, Apr 63, 90p. 10 refs. Technical note D-1634.

NASA N63-12535 OTS $0.75

Lewis Flight Propulsion Lab., National Advisory Committee for Aeronautics, Cleveland, Ohio.
AIRCRAFT-FUEL-TANK DESIGN FOR LIQUID HYDROGEN, by T. W. Reynolds. 9 Aug 55, declassified 1 Dec 62, 28p. 26 refs. Research memo RM E55F22.

AD-282 019 OTS $9.60

National Aeronautical Establishment (Canada).
A CRITICAL REVIEW OF TECHNIQUES FOR THE FLIGHT DETERMINATION OF AIRCRAFT DYNAMIC STABILITY AND RESPONSE CHARACTERISTICS WITH ILLUSTRATIVE EXAMPLES FROM MEASUREMENTS ON A SUBSONIC JET FIGHTER, by H. N. C. Lyster. Mar 62, 114p. 25 refs. Aeronautical rept. LR-336; N. R. C. no. 6825.

DESCRIPTORS: *Jet fighters, *Aerodynamics, Equations. Motion, Subsonic flow, Dynamics, Frequency, Pitch, Roll, Yaw, Flight testing, Data processing systems, Computers, Measurement, Determination, Jet planes, Model tests, Stability, Test methods.

A review is made of the basic relations between the linearized equations of motion of a rigid aircraft, frequency responses, transfer functions and stability derivatives to provide the background for a critical examination of various techniques used in the flight determination of aircraft dynamic stability and response characteristics. The interrelation of instrumentation and data handling methods with the choice of techniques is also noted. Flight determined values of eighteen of the stability derivatives of a subsonic jet fighter are compared with available wind tunnel results and with design and theoretical values. The flying qualities which can be deduced directly from the stability derivatives are compared with those given in recent military specifications. (Author)

AD-283 935 OTS $2.60

National Aeronautical Establishment (Canada).
AN IMPROVED METHOD FOR PRODUCING FOAM-FILLED FIBREGLASS-REINFORCED PLASTIC PROPELLER BLADES, by B. Neal and W. J. Edwards. June 62, 23p. 1 ref. Aeronautical rept. LR-346; A. R. C. no. 6940.

DESCRIPTORS: *Propeller blades, *Expanded plastics, *Production, Glass textiles, Aircraft, Design, Alloys, Aluminum alloys, Fatigue (Mechanics), Plastics, Epoxy resins, Aluminum, Sheets, Templates, Casting, Molding, Urethanes, Vinyl alcohol, Rubber, Impregnation, Resins, Materials, Propeller hubs.

An improved technique for producing foam-filled fibreglass propeller blades suitable for use on powered wind tunnel models is described in detail. If large numbers of blades are required this method can considerably reduce cost and time needed for manufacture. (Author)

AD-283 936 OTS $4.60

National Aeronautical Establishment (Canada).
THE MODEL CONTROLLED METHOD FOR THE DEVELOPMENT OF VARIABLE STABILITY AIRCRAFT, by D. G. Gould. June 62, 46p. 11 refs. Aeronautical rept. LR-345; N. R. C. no. 6914.

DESCRIPTORS: *Helicopters, *Automatic pilots, *Control simulators, Design, Stability, Analog computers, Control, Mathematical analysis, Stability (Lateral), Stability (Longitudinal), Servo systems, Control systems, Simulation

The application of adaptive or semi-adaptive control systems for providing aircraft with variable stability and control characteristics is described. The development of a variable stability helicopter using this method is treated to illustrate the significant design parameters and advantages of the method. The method allows for versatility in regard to simulation of complex equations of motion in that use may be made of standard computing components to construct an electrical analogue of the equations of motion of the simulated aircraft in a manner similar to that employed with ground simulation. An accurate knowledge of the test aircraft stability derivatives and their variation with speed and altitude is not required since the test aircraft response is independent of significant variations in its own characteristics. In the case of application of the method to helicopters, in-flight adjustment of the control loop parameters is not required. (Author)

NASA N63-13184 OTS $1.00

National Aeronautics and Space Administration, Washington, D. C.
RESEARCH PROBLEMS PERTAINING TO AIRCRAFT OPERATIONS, ed. by William A. McGowan and William S. Aiken, Jr. Mar 63, 32p. Technical note D-1596.

PB 181 487 OTS $2.50

National Aviation Facilities Experimental Center, Atlantic City, N. J.
GENERAL DESCRIPTION AND BASIC LOGIC OF THE UNIVAC FILE COMPUTER I AIR TRAFFIC CONTROL/AUTOMATIC DATA PROCESSING SYSTEM, by Kenneth W. House, Don W. Vogel and others. Final rept. Apr 62, 107p. 6 refs. Proj. no. 104-620X; NASA N63-14472, AD-299 991

DESCRIPTORS: *Air traffic control systems, *Data processing systems, Computers, *Computer logic, Programming (Computers), Automatic

The NAFEC Master Operational Computer Program documentation for the Phase I system was used as the basic study for this report. The primary functions required in an air traffic control/automatic data processing system and discussed in this document are : (1) The processing of flight plans whose routes of flight are either via airways or via direct-route segments. (2) The printing of flight progress strips. (3) The transmission of flight plan data to adjacent centers. (4) The modification or cancellation of previously processed flight data. A method of storage of data for chronological processing is also included.

Chemical Engineering

ANL-6596 OTS $3.00

Argonne National Lab., Ill.
CHEMICAL ENGINEERING DIVISION SUMMARY REPORT. Rept. for July-Sep 62, on Contract W31-109-eng-38. 1962. 219p. 66 refs. NASA N63-13024.

NYO-9852 OTS $1.25

Consolidation Coal Co., Library, Pa.
UTILIZATION OF RADIOACTIVE ISOTOPES IN COAL PROCESS RESEARCH, by P. M. Yavorsky and E. Gorin. Final rept. no. 3, 1 June 61-31 May 62, on Contract AT(30-1)2350. 31 May 62, 53p. 15 refs.

UCRL-10625 OTS $1.00

Lawrence Radiation Lab., U. of California, Berkeley.
MECHANISM OF LIQUID-LIQUID SETTLING, by Albert D. Epstein and C. R. Wilke. Rept. on Contract W7405-eng-48. 14 Jan 63, 49p. 18 refs. NASA N63-14082.

NLCO-867 OTS $0.50

National Lead Co. of Ohio, Cincinnati.
ROLE OF INORGANIC SURFACTANTS IN LIQUID-LIQUID EXTRACTION SYSTEMS, by Thomas J. Collopy and John H. Mueller. Rept. on Contract AT(30-1)1156. 14 Mar 63, 25p. 6 refs.

PB 181 486 OTS $1.75

Oklahoma U. Research Inst., Norman.
THEORETICAL STUDIES OF THE BEHAVIOR OF IONS IN AQUEOUS SOLUTIONS OF MIXED ELECTROLYTES WITH RESPECT TO OSMIONIC CELL OPERATION, by George W. Murphy and Robert R. Matthews. Rept. on Contract 14-01-001-191. July 63, 64p. 68 refs. Saline Water Research and Development Progress rept. no. 76.

DESCRIPTORS: *Sea water, *Desalination, *Thermodynamics, Ions, Solutions, Electrolytes, *Electroosmosis, Membranes, Semipermeability, *Electrolytic cells, Theory, *Programming (Computers)

Contents:
Non-equilibrium thermodynamics
Systems containing ion-permeable membranes
Theoretical
Calculations
A program for computer solution of equations (39)

PB 181 484 OTS $2.50

Prengle, Dukler and Crump, Inc., Houston, Tex.
HEAT TRANSFER IN THE LTV EVAPORATOR, AN ANALYSIS OF PILOT PLANT DATA AND PREDICTIVE TECHNIQUES FOR PLANT OPERATION AND DESIGN. June 63, 107p. 32 refs. Saline Water Research and Development Progress rept. no. 74.

DESCRIPTORS: *Sea water, *Desalination, *Evaporators, Models (Simulations), *Heat transfer, *Scale, Films, Evaporation, Fluid flow, Vaporization, Condensation.

This study was directed toward resolving the uncertainties in the design and prediction methods for heat transfer performance as well as toward analyzing certain aspects of the scaling problem. A theory for condensation heat transfer coefficients was modified to predict coefficients for evaporating films. Two phase pressure drop in the tube is significant, causing substantial changes in temperature and in ΔT driving force. The overall coefficients do not drop markedly in the low pressure effect. Steam side resistances were significantly larger than those on the saline side. Entrainment in the two inch tube may be as high as 30% at high vacuum conditions. The optimum plant design can not be achieved by using tube diameters and lengths which are the same for all effects. Once pressure drop and entrainment rates can be determined with accuracy it will be possible to select a distribution of tube size and lengths which will produce optimum performance in a multi-stage system.

PB 181 485 OTS $1.00

Western Independent Research Labs., Inc., Los Angeles, Calif.
DEMINERALIZATION OF SALINE WATER THROUGH PRESSURIZATION CYCLES WITH ION EXCHANGE MATERIALS. Rept. on Contract 14-01-001-238. July 63, 33p. 32 refs. Saline Water Research and Development Progress rept. no. 75.

DESCRIPTORS: *Sea water, Desalination, *Ion exchange resins, Pressure, Periodic variations, *Pressure regulators, Minerals, Separation.

The application of mechanical pressure to ion exchange materials equilibrated with saline solution has been shown to produce effluent with considerably reduced salt concentration. Using the most efficient resin and a final pressure of 6255 psi, the concentration of 0.7 molar sodium chloride was reduced to 0.01 molar in four cycles. Most of the imbided salt appears in the first half of the pressure eluted solution, its concentration dropping rapidly thereafter. Thus, the last 15% of the effluent from the first pressurization cycle had a salt concentration below 0.02 molar. Alternatively, a pressurization cycle performed on the second half of the effluent from the initial cycle, produced an effluent the latter half of which was sub-0.01 molar in salt concentration. Thus, by taking proper cuts, no more than two and, possibly one stage can suffice to accomplish the desalinization. Experiments on seawater indicated essential agreement with the observed results on the sodium chloride solution. Hydraulic pressurization methods appeared to offer the possibility of reduced equipment construction requirements. Initial studies with pressurization cycles on resin sheets produced much smaller effluent volumes, but comparable effluent salt concentrations.

PB 163 083 OTS $5.60

Amphenol-Borg Electronics Corp., Chicago, Ill.
RESEARCH ON R. F. COAXIAL CONNECTORS, BROADBAND, HIGH TEMPERATURE, RADIATION RESISTANT, by J. V. Malek. Scientific rept. no. 4, 1 Dec 59-1 Mar 60, on Contract AF 33(616)6243. Mar 60, 53p. 7 refs. AD-234 209.

DESCRIPTORS: *Coaxial cables, *Electric connectors, Radiofrequency, Broadband, *Heat resistant materials, *Electric insulators, *Silicon compounds, Dioxides, Fused materials, Dielectric properties, Conductors, Clamps, Seals (Stoppers)

Fused silica was evaluated at 525°C and it is observed that the dielectric constant of this material is independent of temperature between 25°C and 525°C. A very low reflection insulator-contact structure was devised in the 1.0 to 12.0 Kmc/s frequency range utilizing fused silica as a dielectric. The effects of female contact tine configuration were evaluated as a source of electrical reflection introduction. Additionally, the effects of axial gaps in center and outer conductors which usually occur in present day R. F. connectors were theoretically analyzed and resultant effects on connector voltage standing wave ratio are presented. Basic evaluation test data on promising contact materials, commercial cable clamping and sealing devices, and high temperature connector mating face seals is set forth. Sealing studies and work conducted to date, related to the insulator-contact-shell structure, are also presented. (Author)

AD-274 143 OTS $3.60

Arinc Research Corp., Washington, D. C.
THE CHALLENGE OF MILITARY ELECTRONICS TO INDUSTRIAL READINESS. TRENDS IN TECHNOLOGY AND QUANTITATIVE REQUIREMENTS FOR ELECTRONIC CIRCUIT PACKAGES, 1960-1970, by E. R. Jones. Rept. on Contract NOw-61-0395-C, continuation of Contract NOas-59-4180-C. [1962] 40p. 5 refs. [Rept. no. 171-1-243].

DESCRIPTORS: *Electronic equipment, Military requirements, Production, Manufacturing methods, *Industrial production, Statistical analysis, Miniature electronic equipment, Subminiature electronic equipment, Electronic circuits, Packaged circuits, Printed circuits, Costs, *Military procurement, Radio receivers, Radar receivers.

This report briefly summarizes current estimates of future military requirements in the field of electronic equipment. The estimates cover the next five-year and ten-year periods, and particular emphasis is placed on requirements for complex components capable of withstanding severe environment. The predicted requirements are compared with the industrial capability of the United States, with a view to determining areas in which additional effort is needed in order to maintain industrial readiness under the peacetime and mobilization conditions projected for the next ten years. (Author)

PB 163 138 OTS $5.60

Armour Research Foundation, Chicago, Ill.
DESIGN AND DEVELOPMENT OF MINIATURE RF CABLES AND CONNECTORS, by R. M. Janowiak and J. E. McManus. Final rept. 1 Feb 58-31 Jan 60, on Contract DA 36-039-sc-74956. 31 Jan 60, 58p. ARF Proj. no. E096; AD-237 529.

DESCRIPTORS: Design, *Radiofrequency cables, *Electric cables, *Electric connectors, *Miniature electrical equipment, *Coaxial cables, Tests.

Nine groups of commercial connectors were assembled onto 0.200 in outer diameter coaxial cable. Each group consisting of approximately 40 connector pairs (plug and jack) were subjected to a series of environmental tests. All of the groups did not participate in every environmental test which included voltage standing wave ratio, high potential, leakage, durability, static cable pull, flexure and temperature cycle. An analysis of the results of these tests provided knowledge on the advantages and disadvantages of each commercial connector. The design of a series of transitions was necessary to enable the rapid testing of a large number of connector pairs. Experience gained in the transition design proved to be directly applicable to the connector design phase of this program. Pictures of the various transitions together with their VSWR performance characteristics are included. A connector series consisting of a plug, jack, plug to plug adapter, plug to BNC plug adapter, and receptacle were designed and developed. The plug and jack are designed for good RF performance, ease of assembly, and excellent cable clamping. The design of the plug and jack consist of only four pieces discounting bulkhead mounting parts and may be assembled and reassembled using only standard tools. (Author)

PB 163 122 OTS $4.60

Armour Research Foundation, Chicago, Ill.
INSTRUCTION MANUAL FOR THE FLUX RESPONSIVE TAPE REPRODUCER, by M. E. Anderson and K. Kirvaitis. Rept. on Contract AF 33(600)41699. [1960] 42p. ARF Proj. E142.

DESCRIPTORS: *Instruction manuals, *Magnetic recording systems, Maintenance, Operation, Design, Circuits, Magnetic tapes

Topics include: Description of the system; magnetic modulator playback head (principle of operation; maintenance and initial alignment procedures (playback electronics, playback head); operating procedures (tape transport, playback electronics); and, performance characteristics of the system (frequency response, signal-to-noise ratio, system linearity, wow and flutter, crosstalk).

AD-299 259 repriced $1.25

Harry Diamond Labs., Washington, D. C.
ELECTRETS. PART I. A STATE OF THE ART SURVEY, by Virginia Ann Johnson. 31 Aug 62, 49p. 77 refs. Rept. no. TR-1045.

DESCRIPTORS: *Electrets, Dielectric properties, Polarization, Electric currents, Piezoelectric effect.

A survey is presented of current knowledge with respect to electrets. A history of contributive results is traced with respect to experimentation, theory, and major applications. Specific summaries are made of Theory, Formation, Performance and Applications. The open or unsolved areas in electret theory and some possible desirable applications are indicated. (Author)

PB 163 104 OTS $13.00

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
ASTRONAUTICS INFORMATION. THERMIONICS AND THERMOELECTRICITY, comp. by Edda Barber. Rept. on Contract NASw-6. Dec 60, 189p. 1006 refs. Literature Search no. 294.

DESCRIPTORS: *Astronautics, *Bibliographies, *Thermionic emission, *Thermionic converters, *Thermoelectricity, *Thermoelectric generators, Materials.

The material in this search is divided into two sections: (1) Thermionics. Power generating devices and energy conversion units, based on the principle of thermionic emission are included. These are of two types, vacuum and gas-filled. Material has not been collected on the theory of thermionic emission. (2) Thermoelectricity. Material is included on the theory of thermoelectricity, thermoelectric properties of materials, Peltier cooling and refrigeration, and thermoelectric generators and systems. In each section the material is divided into the following categories: books, reports, and periodicals. Books are arranged in alphabetical order by author and reports in alphabetical order by source. Periodicals are arranged in chronological order by year, and within each year in alphabetical order by title. Author and subject guides are provided.

AD-275 469 OTS $2.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
A MORE PRECISE ANALYSIS OF MULTICAVITY KLYSTRONS. I. SOLUTIONS OF THE BOUNDARY-VALUE PROBLEM, by R. L. Pease. Rept. on Contract AF 19(604)7400. 28 Mar 62, 25p. 12 refs. Technical rept. no. 264.

DESCRIPTORS: *Klystrons, *Cavity resonators, Space charges, Electrons, Electron beams, Partial differential equations, Integrals.

The present gross inaccuracies in space-charge calculations of klystron electronic conductance are attributed to certain approximations made in solving the wave equation. Exact homogeneous and inhomogeneous solutions for the wave equation are derived, the latter by contour integration, and the results compared with previous approximate solutions. With the more accurate solutions, conservation of kinetic power no longer holds. (Author)

AD-274 554 OTS $3.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
SECONDARY EMISSION CHARACTERISTICS OF HIGH-POWER MICROWAVE TUBE SURFACES, by A. Vierstra and R. C. Butman. Rept. on Contract AF 19(604)7400. 20 Feb 62, 35p. 16 refs. Technical rept. no. 257.

DESCRIPTORS: *Microwave amplifiers, *Power amplifiers, *Klystrons, *Beam power tubes, Electron tubes, *Secondary emission, Plasma physics, Targets, Materials, *Coatings, Surface properties, Copper, Stainless steel, Titanium compounds, Boron compounds, Zirconium compounds, Chromium compounds, Tungsten compounds, Carbides, Borides, Nitrides, Electron bombardment, Magnetic fields, Radiofrequency power, Resistance, Thermal conductivity.

This report describes various surface treatments and coatings on copper and stainless steel and gives their secondary emission ratios. Detailed data on plasma-torch coatings of TiC, VB_2, WC and TiB_2, which have maximum secondary emission ratios less than unity even for large angles of incidence and which are suitable for use in high-power microwave tubes, are included. (Author)

LAMS-2797 OTS $0.75

Los Alamos Scientific Lab., N. Mex.
EPOXY POTTING SYSTEMS FOR HIGH VOLTAGE, HIGH AMPERAGE CIRCUITRY, by E. Philip Ehart and James S. Church. Rept. on Contract W7405-eng-36. 15 Aug 62, 27p. NASA N63-13414.

AD-281 945 OTS $11.00

Naval Avionics Facility, Indianapolis, Ind.
A GENERAL PURPOSE TEN-WATT TRANSISTORIZED SERVO AMPLIFIER, by Robert R. Atherton and Eldon W. Hawkins. 31 July 61, 146p. Rept. no. TR-77.

DESCRIPTORS: *Servo amplifiers, Transistors, Reliability (Electronics) Semiconductors, Feedback amplifiers, Feedback, Servo systems, Impedance

This report presents the results of a development effort to design a transistorized servo amplifier for general use in a variety of commonly occurring servo systems using BuWeps precision components. Detailed information applicable to Amplifier AM-2937 (XAN-1) USW is given. In addition, a section is included which is devoted to servo applications and techniques for the servo systems designer. (Author)

PB 163 123 OTS $6.60

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
THE SELECTION OF NETWORK FUNCTIONS TO APPROXIMATE PRESCRIBED FREQUENCY CHARACTERISTICS, by J. G. Linvill. [Rept. on Contract W36-039-sc-32037]. 14 Mar 50, 67p. 12 refs. Technical rept. no. 145; ATI-83 680.

DESCRIPTORS: Networks, *Electrical networks, Electric filters, Circuits, *Functions, *Frequency, Phase studies, Numerical analysis, Algebra

A successive-approximations method is applied to the selection of network functions having desired magnitude and phase variation with frequency. The successive trial functions are specified in terms of the location of their poles and zeros in the complex frequency plane. The first approximation is an estimate of suitable pole and zero positions. The deviation of characteristics of the first estimate from the desired characteristics is determined, and changes in pole and zero positions are evaluated which tend to erase these deviations in the succeeding approximation. A set of normalized functions is presented, relating changes in the magnitude and phase characteristic to changes in the pole and zero positions. The first stage of the adjustment procedure is sufficient for most problems; however, the method may be carried as far as necessary for precise results.

NASA N63-12826 OTS $2.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
A PRELIMINARY REPORT ON TWO BIO-ELECTROGENIC SYSTEMS, by L. W. Reynolds and J. J. Konikoff. Rept. on Contract NASw-511. Sep 62, 26p. 5 refs. R62SD78.

AD-293 836 OTS $7.60

Stanford Electronics Labs., Stanford U., Calif.
NONLINEAR DISTORTION IN FREQUENCY-DEPENDENT TWO-PORT SYSTEMS WITH APPLICATION TO COMMON-EMITTER TRANSISTOR AMPLIFIERS, by Lit N. Ma. Rept. on Contract Nonr-225(24). Oct 62, 74p. 7 refs. Technical rept. no. 1611-1; SEL-62-093.

DESCRIPTORS: *Transistor amplifiers, *Nonlinear systems, *Distortion, Mathematical analysis, Taylor's series, Partial differential equations

For a class of frequency-dependent two-port systems, such departure can be obtained by representing the terminal current at each port by a Taylor series of four variables, viz, two terminal voltages and their first time derivatives. From this representation a linear model for the solution of harmonic distortions in a two-port system can be constructed to consist of a set of harmonic current generators at each terminal in addition to the linear small-signal model. Such a model using harmonic current generators is valid for two-port systems which depart only slightly from linear behavior, and is suitable for use with general linear termination. Using this model, the solution for harmonic distortion is reduced to the solution of a sequence of linear equations. As an application of the analysis, the nonlinear distortion of alloy junction transistor amplifiers at low current levels is determined. The nonlinearities due to the "law of the junction" and the space-charge layer widening effect are considered. The nonlinearities of the low-frequency common-emitter short-circuit current gain β_o and the β cut-off frequency f_β are also included. The results indicate that the model is valid over an extended range of frequencies and bias conditions. (Author)

AD-294 818 OTS $3.60

Stanford Electronics Labs., Stanford U., Calif.
TRANSIENT RESPONSE OF JUNCTION DIODES, by J. G. Linvill and W. Wunderlin. Rept. on Contract Nonr-225(44). Aug 62, 37p. 1 ref. Technical rept. no. 1513-1; SEL-62-107.

DESCRIPTORS: *Diodes, *Semiconductors, Rectifiers, Electronic circuits, Mathematical analysis, Electron transitions, Differential equations, Theory, Transients.

The relationship between the performance of junction diodes in pulse circuits and their performance in rectifier circuits is developed. Parameters of a

lumped model of a junction diode are determined from recovery-time measurements of the diode in a pulse circuit. The response of the diode in single-diode and bridge-rectifier circuits is then predicted by computation using the lumped model. The computed rectification efficiencies and waveforms are found to correspond closely to measured results. Thus, a simple lumped model of only two free parameters accurately represents the behavior of junction diodes in pulse and rectifier circuits. The detailed analysis given deals with the shortbase diode (the base length being short compared to a diffusion length), although the method is applicable to the long-base case as well. (Author)

AD-299 004 repriced OTS $2.25

Tapco West Coast Engineering, Thompson Ramo Wooldridge, Inglewood, Calif.
LONG-LIFE THERMIONIC CONVERTERS FOR SOLAR POWER SYSTEMS. Final rept., Mar 61-Oct 62, on Thermo Electron Engineering Corp. Subcontract AF 33(616)8114. Feb 63, 91p. Rept. no. ER-5137; ASD-TDR-62-1069.

DESCRIPTORS: *Thermionic converters, *Electric power production, *Thermionic emission, Design, Effectiveness, Temperature, Electric potential, Cesium, Instrumentation, Failure (Mechanics), Space environmental conditions, Test methods, Test facilities, Solar cells, Life expectancy.

This report describes an applied research program directed toward increasing the cycle life of thermionic converters which can be used in solar thermionic generators. The results of cycle life tests of five thermionic converters, and the results of a solar test of a cavity-type thermionic generator which used five converters identical to the life test converters, are presented. A complete discussion of all specialized equipment and techniques is also included along with design details. The life tests demonstrated that converters have operating life capabilities under cyclic conditions of 596 hours. The solar test program has shown that good correlation can be had with laboratory test results. (Author)

PB 163 092 OTS $3.60

Varian Associates, Palo Alto, Calif.
RESEARCH ON MOLECULAR AND ATOMIC RESONANCE DEVICES, by J. C. Helmer and M. W. Muller. Quarterly rept. no. 1, 1 July-30 Sep 57, on Contract DA 36-039-sc-73266. [1957] 33p. 15 refs. Engineering rept. no. 218-1Q; AD-154 342.

DESCRIPTORS: *Masers, Noise (Radio), Measurement, Molecular beams, Microwave amplifiers, Amplifiers, Microwave oscillators, Oscillators, Resonance, Focusing

Efforts were made to increase the knowledge concerning the properties of molecular and atomic resonance devices for use as submillimeter wave generators and/or amplifiers. The differences between the method of this measurement and methods used by others are also discussed. The requirements for a maser oscillator to act as a local oscillator in a linear system are stated. The noise figure for 2 transmission amplifiers and 1 reflection amplifier were calculated. Although the 3 equations differed in form in the region of low power gain, in all cases for sufficiently high gain, the noise figure was constant and the forms of the 3 equations became identical. The total NH_3 flow rate at the input to the maser was accurately measured to be about 10^{17} mol/sec under operating conditions. The conclusion was made that a pumping speed of at least 100 l/sec was necessary to evacuate the machine without the use of liquid N. A measurement of the movement of line center with varying focusing voltage was compared with the theoretical predictions of K. Shimoda (J. Phys. Soc. Japan 12:1006, 1957). (See also PB 137 923)

PB 163 093 OTS $5.60

Varian Associates, Palo Alto, Calif.
RESEARCH ON MOLECULAR AND ATOMIC RESONANCE DEVICES, by John C. Helmer, H. E. Weaver and others. Quarterly rept. no. 2, 1 Oct-31 Dec 57, on Contract DA 36-039-sc-73266. [1958] 59p. 6 refs. Engineering rept. no. 218-2Q; AD-158 606.

DESCRIPTORS: *Masers, *Molecular beams, Solid state physics, Barium compounds, Titanates, Single crystals, Paramagnetic resonance, Microwave amplifiers.

A molecular beam maser with a diverging, univelocity beam is analyzed. The assumption of a diverging beam is much closer to reality than the parallel beams which have been considered in previous analyses. The molecular flux required to start oscillation, and the molecular Q are calculated as a function of cavity length. Two new results are obtained. For a beam of given divergence, it is shown that there is a cavity length which requires the least molecular flux to start oscillation. It is also found that the molecular Q is not proportional to the length of the cavity. This analysis is compared with an extension of the velocity distribution theory of K. Shimoda and reasonable agreement is obtained. On the basis of this agreement, it is possible to define an effective divergence of the velocity distributed beam. Paramagnetic resonance in barium titanate is investigated for the possibility of maser operation. The EPR spectrum shows that the paramagnetism probably arises from an Fe^{3+} impurity which goes into the titanium position in the $BaTiO_3$ crystal. At zero magnetic field, the ground state is split three ways by the crystalline electric field. Thus the crystal may be used as a zero field Bloembergen-type maser element. (Author)

PB 163 094 OTS $4.60

Varian Associates, Palo Alto, Calif.
RESEARCH ON MOLECULAR AND ATOMIC RESONANCE DEVICES, by J. C. Helmer, M. W. Muller and others. Quarterly rept. no. 3, 1 Jan-31 Mar 58, on Contract DA 36-039-sc-73266. 9 Sep 58, 50p. 11 refs. Engineering rept. no. 218-3Q; AD-201 845.

DESCRIPTORS: *Masers, *Molecular beams, *Focusing, Solid state physics, Barium compounds, Titanates, Crystallization, Microwave amplifiers, *Microwave oscillators.

The theory of a new maser beam focuser is presented. It is shown that for the same maser power output, this focusing system results in a substantial reduction in the total gas flow as compared with focusers now in use. In

addition, a theory of beam effusion indicates that with the type of effuser that is required, more intense molecular beams may be produced. A pumping experiment shows that the flow of gas which causes the maser to oscillate with the new focusing system may be pumped entirely by Varian Vaclon high-vacuum sputter pumps without the use of liquid nitrogen. It is therefore concluded that a sealed-off system could be built. A theoretical investigation of second-order mixing processes in masers is presented. It is shown that with the ammonia beam as the active medium, measurable effects can only be obtained with excessive local oscillator power. A spectroscopic analysis of barium titanate crystals shows that there are both iron and platinum impurities present. (See also PB 163 093)

AD-299 024 repriced OTS $2.50

Westinghouse Electric Corp., Dayton, Ohio.
RESEARCH ON IMPROVED SOLAR GENERATOR, ed. by K. S. Tarneja. Final rept., Oct 61-Oct 62, on Contract AF 33(657)7649. Jan 63, 116p. 11 refs. ASD-TDR-62-1000.

DESCRIPTORS: *Solar cells, *Semiconductors, Energy conversion, Solar radiation, Electron transitions, Equations, Preparation, Reduction (Chemistry), Tables, Theory, Effectiveness, Photoelectric cells (Semiconductor), Silicon.

Theoretical studies directed towards the achievement of high efficiency solar cells were undertaken. Some of the basic theoretical considerations which govern the design and behavior of photovoltaic cells were analyzed. A method was proposed for using artificial light sources to predict with accuracy cell performance under solar radiation, without resource to the latter. The problems involved in growing wider silicon sheets are discussed. Preparation of solar cells by diffusion of boron into webbed silicon dendrites, using boron trichloride as the source, and complete fabrication of solar cells is described. Efficiencies as high as 13% were achieved on 12.7cm x lcm x .05cm thick solar cells prepared from silicon webbed dendrites. Solar cells were successfully prepared on lcm x 30cm x .05cm and lcm x 15cm x .05cm using silicon webbed dendrites. Efficiencies as high as 10% and 12% were achieved on these respectively. An operational prototype panel was provided. (Author)

Ordnance, Missiles, and Satellite Vehicles

NASA N63-12562 OTS $1.00

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
THE AMES ATMOSPHERE ENTRY SIMULATOR AND ITS APPLICATION TO THE DETERMINATION OF ABLATIVE PROPERTIES OF MATERIALS FOR BALLISTIC MISSILES, by Frank M. Hamaker. Oct 60, declassified 25 Oct 62, 33p. 10 refs. Technical memo X-394.

NASA N63-15052 OTS $1.00

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
PREDICTION OF VELOCITY REQUIREMENTS FOR MINIMUM TIME ABORTS FROM THE MIDCOURSE REGION OF A LUNAR MISSION, by Robert B. Merrick and George P. Callas. Apr 63, 40p. 7 refs. Technical note D-1655.

PB 163 115 OTS $6.60

Applied Physics Lab., Johns Hopkins U., Silver Spring, Md.
EFFECTS OF RANDOM MOTION EXCITATION ON ELECTRONIC EQUIPMENT, by John Jellinek, Master's thesis. Rept. on Contract NOrd 7386. Jan 59, 70p. 9 refs. Bumblebee rept. no. 281; AD-233 886.

DESCRIPTORS: *Electronic equipment, Vibration, Reliability, Relays, Mathematical analysis, Beams, *Guided missiles, Surface to air, Airborne, Statistical analysis, Probability.

Application of the methods of vibration analysis is shown for a beam, chassis, and relay system representative of those used in missile electronics, and the probability of contact point failure is determined. Simplifying assumptions are made about the physical system, and the random excitation is statistically described. The frequency response, including the effect of structural damping, is determined for each structure, permitting prediction of the probability of exceeding any specific magnitude of displacement, acceleration, or stress at any point in the system. (Author)

PB 163 141 OTS $1.60

Ballistic Research Labs., Aberdeen Proving Grounds, Md.
MODEL STUDIES OF CRATER FORMATION, by Paul H. Lorrain, Robert, J. Koenig, and Willis F. Jackson. Apr 57, 13p. 2 refs. Technical note no. 1115.

DESCRIPTORS: *Explosion effects, *Cratering, Model tests, Sand, Analysis, Underground explosions, Soil mechanics.

Essentially two-dimensional model studies have been made to determine the motion of the soil and the diameter of craters produced by explosions in a thin layer of sand. The explosions were created by means of a spark discharge. The motion of the sand in the model is similar to that indicated by field experiments using buried vertical colored columns as a reference grid. The data concerning crater dimensions show reasonable agreement with field results if the model measurements are scaled by the square root of the energy rather than the cube root used for field data. (Author)

PB 163 142 OTS $1.10

Ballistic Research Labs., Aberdeen Proving Ground, Md.
A NEW TECHNIQUE FOR STUDYING CRATER PHENOMENA, by Beauregard Perkins, Jr. Mar 54, 10p. Technical note no. 880.

DESCRIPTORS: *Explosion effects, *Cratering, Sand, Plasticity, Deformation, Analysis, Explosions, Underground explosions

A technique to show the movement of the ground near the edge of the crater is described. Vertical holes, spaced a few inches apart, are drilled along a straight line. These are filled with colored sand. Following an explosion at the center of the line, the earth is excavated from one side of the columns. Plastic movement and shears can be noted in the columns. A few tentative conclusions are given. (Author)

PB 163 139 OTS $1.10

Ballistic Research Labs., Aberdeen Proving Ground, Md.
WEIGHT OF MATERIAL REQUIRED TO FILL BOMB CRATERS (MODEL EXPERIMENTS), by U. Fano. 21 Sep 44, 10p. Rept. no. 488.

DESCRIPTORS: *Cratering, *Soil mechanics, Weight, Soils, Explosion effects, Test methods, Bombs, Model tests.

Experiments were conducted to determine the weight of material required to fill bomb craters, in excess of the loose material available within and around the craters. In a soil of average hardness this weight was found to attain its maximum value of about 1000 lbs. per every pound of explosive charge if the charge is detonated at a depth of

$$1.5 \times W^{1/3} \text{ to } 2 \times W^{1/3} \text{ ft.}$$

where $W^{1/3}$ is the cube root of the weight of explosive expressed in pounds. (Author)

NASA N63-14429 OTS $1.00

Flight Research Center, National Aeronautics and Space Administration, Edwards, Calif.
PRELIMINARY FLIGHT EVALUATION OF TWO UNPOWERED MANNED PARAGLIDERS, by Garrison P. Layton, Jr. and Milton O. Thompson, Apr 63, 33p. 4 refs. Technical note D-1826.

NASA N63-13721 OTS $0.75

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
NIKE APACHE PERFORMANCE HANDBOOK, by Reed B. Jenkins. Mar 63, 25p. 5 refs. Technical note D-1699.

NASA N63-15053 OTS $0.50

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
PORTABLE INTEGRATING SPHERE FOR MONITORING REFLECTANCE OF SPACECRAFT COATINGS, by F. A. Jerozal, W. B. Fussell, and J. J. Triolo. Apr 63, 15p. 7 refs. Technical note D-1714.

NASA N63-14626 OTS $0.50

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
A SURVEY OF LARGE SPACE CHAMBERS, by R. T. Hollingsworth, Apr 63, 15p. Technical note D-1673.

NASA N63-15055 OTS $0.50

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
VEHICLE TECHNOLOGY CONSIDERATIONS FOR A SOLAR PROBE, by John A. Foschetti. Apr 63, 15p. 4 refs. Technical note D-1747.

NASA N63-13486 OTS $31.00

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
EARTH-VENUS TRAJECTORIES, 1964, VOLUME 1, PART A, by V. C. Clarke, Jr., R. Y. Roth and others. Rept. on Contract NAS7-100. 31 Oct 62, 790p. 9 refs. Technical memo. no. 33-99.

NASA N63-15308 OTS $2.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
AERODYNAMIC CHARACTERISTICS OF TOWED SPHERES, CONICAL RINGS, AND CONES USED AS DECELERATORS AT MACH NUMBERS FROM 1.57 TO 4.65, by Nicholai Charczenko. Apr 63, 80p. 6 refs. Technical note D-1789.

NASA N63-13219 OTS $1.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
AN ANALYTICAL STUDY OF A SIMPLE ATTITUDE CONTROL SYSTEM FOR A FINNED VEHICLE, by Jack E. Harris. Mar 63, 35p. 4 refs. Technical note D-1608.

NASA N63-15306 OTS $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
EFFECT OF LIFT ON SEPARATION DISTANCE AND LOADS FOR AN ABORTING VEHICLE AT MAXIMUM DYNAMIC PRESSURE OF A LUNAR MISSION, by Joseph J. Janos and John R. Unangst. Apr 63, 26p. 3 refs. Technical note D-1775.

NASA N63-15051 OTS $0.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
AN EXPERIMENTAL STUDY OF THE BEHAVIOR OF SPHERES ABLATING UNDER CONSTANT AERODYNAMIC CONDITIONS, by Robert R. Howell. Apr 63, 16p. 4 refs. Technical note D-1635.

NASA N63-15236 OTS $0.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
GEOMETRICAL CHARACTERISTICS OF LUNAR ORBITS ESTABLISHED FROM EARTH-MOON TRAJECTORIES, by Robert H. Tolson, Apr 63, 21p. 6 refs. Technical note D-1780.

NASA N63-13788 OTS $1.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
LONGITUDINAL AERODYNAMIC CHARACTERISTICS AT MACH NUMBERS FROM 0.40 TO 1.10 OF A BLUNTED RIGHT-TRIANGULAR PYRAMIDAL LIFTING REENTRY CONFIGURATION EMPLOYING VARIABLE-SWEEP WING PANELS, by Bernard Spencer, Jr. Mar 63, 70p. 10 refs. Technical note D-1518.

NASA N62-16467 OTS $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
ONE-DIMENSIONAL HEAT CONDUCTION THROUGH THE SKIN OF A VEHICLE UPON ENTERING A PLANETARY ATMOSPHERE AT CONSTANT VELOCITY AND ENTRY ANGLE, by William R. Wells and Charles H. McLellan. Oct 62, 25p. 9 refs. Technical note D-1476.

NASA N63-15304 OTS $1.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
A PARAMETRIC INVESTIGATION OF THE LUNAR-ORBIT-RENDEZVOUS SCHEME, by David F. Thomas and John D. Bird. Apr 63, 64p. 2 refs. Technical note D-1623.

NASA N63-13548 OTS $1.25

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
PERFORMANCE AND SOME DESIGN ASPECTS OF THE FOUR-STAGE SOLID-PROPELLANT ROCKET VEHICLE USED IN THE RAM A1 FLIGHT TEST, by Jack Levine. Mar 63, 50p. 10 refs. Technical note D-1611.

NASA N63-13790 OTS $0.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
PILOT-CONTROLLED SIMULATION OF RENDEZVOUS BETWEEN A SPACECRAFT AND A COMMANDED MODULE HAVING LOW THRUST, by Gary P. Beasley, Mar 63, 17p. 4 refs. Technical note D-1613.

NASA N63-13187 OTS $0.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
SELF-ERECTING FLEXIBLE FOAM STRUCTURES FOR SPACE ANTENNAS, by Victor L. Vaughan, Jr. and Edward L. Hoffman. Mar 63, 17p. 1 ref. Technical note D-1610.

NASA N63-14811 OTS $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
SIMILITUDE IN THERMAL MODELS OF SPACECRAFT, by S. Katzoff, Apr 63, 29p. 3 refs. Technical note D-1631.

NASA N63-13188 OTS $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
A STUDY OF THE EFFECTS OF BANK ANGLE, BANKING DURATION, AND TRAJECTORY POSITION OF INITIAL BANKING ON THE LATERAL AND LONGITUDINAL RANGES OF A HYPERSONIC GLOBAL REENTRY VEHICLE, by Gene W. Sparrow. Mar 63, 25p. 2 refs. Technical note D-1617.

NASA N63-15302 OTS $0.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
THEORETICAL STABILITY ANALYSIS OF SKID-ROCKET LANDINGS OF SPACE VEHICLES, by Robert W. Fralich and Edwin T. Kruszewski, Apr 63, 19p. 2 refs. Technical note D-1625.

PB 163 102 OTS $4.60

Lockheed [Aircraft Corp.] Palo Alto, Calif.
TRENDS IN MISSILE AND SPACE TELEMETRY, by Joachim W. Muehlner. [1962] 45p. 26 refs. Rept. no. 5-10-62-28; NASA N63-10003.

DESCRIPTORS: *Telemeter systems, *Telemetering data, Guided missiles, Satellites (Artificial), Data transmission systems, Multiplex.

NASA N63-15347 OTS $0.75

Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
CALCULATED RESULTS FOR THE TRANSIENT HEATING AND MELTING PROCESS OF GLASS SHIELDS WITH VARIOUS MATERIAL PROPERTIES AT THE STAGNATION POINT OF A RE-ENTERING ICBM, by John D. Warmbrod, May 63, 28p. 12 refs. Technical note D-1643.

NASA N63-13515 OTS $1.00

Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
A CONSIDERATION OF LUNAR SURFACE BALLISTICS AND THE HAZARDS ASSOCIATED WITH SPACECRAFT LANDING OR LAUNCH OPERATIONS, by D. C. Cramblit. Mar 63, 33p. 14 refs. Technical note D-1526.

NASA N63-15351 OTS $2.25

Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
INFLUENCE OF WEIGHT PARAMETERS ON THE PROPULSION REQUIREMENTS OF ORBIT-LAUNCHED VEHICLES, by Dietrich W. Fellenz and Ronald J. Harris. May 63, 91p. 11 refs. Technical note D-1525.

NASA N63-13303 OTS $0.50

Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
PROPOSAL FOR DETERMINING THE MASS OF LIQUID PROPELLANT WITHIN A SPACE VEHICLE PROPELLANT TANK SUBJECTED TO A ZERO GRAVITY ENVIRONMENT, by R. L. Evans and J. R. Oliver. Mar 63, 11p. Technical note D-1571.

NASA N63-13189 OTS $1.25

Southwest Research Inst., San Antonio, Tex.
GAS CHROMATOGRAPHIC MEASUREMENT OF TRACE CONTAMINANTS IN A SIMULATED SPACE CABIN, by Herbert C. McKee, John W. Rhoades and others. Rept. on Contract NASw-150. Mar 63, 42p. 9 refs. NASA Technical note D-1825.

PB 163 112 OTS $3.60

Zenith Radio Corp., Chicago, Ill.
FEASIBILITY STUDY ON THE APPLICATION OF COLOR CENTER PHENOMENON IN A SOLID STATE VIEWING DEVICE TO PREVENT FLASH BLINDNESS AND RETINAL BURN, by John Konitzer, Richard Jarka, and Herbert N. Hersh. Final rept. on Contract DA 11-022-ORD-3468. [1961] 32p.

DESCRIPTORS: *Color centers, Colors, *Crystals, Crystal growth, Radiation effects, *Blindness, Retina, Burns, Absorption, *Optical materials, Velocity, Light, Optical equipment, X-rays, Halides, Potassium compounds, Impurities, Ultraviolet radiation, Tanks (Combat vehicles), Windshields, Nuclear explosions

An investigation was made into the feasibility of employing the color center phenomenon as the operating principle of a fast, non-mechanical optical shutter. (In this phenomenon an optically transparent substance is rendered opaque when sufficiently exposed to a source of radiation or to an electrical field.). It has been established that certain necessary conditions for feasibility are satisfied, viz. that the intrinsic mechanism for shuttering action is fast enough and that the induced optical absorption is high enough. It remains to develop materials sufficiently sensitive for a practical device. Materials have been prepared and studies made of the effects of mechanical, chemical and other pre-sensitizing treatments on the speed of darkening (closing of shutter). It has been shown that these materials are amenable to improvements in closing time. (Author)

Sanitation and Safety Engineering

PB 163 106 OTS $7.60

Institute of Engineering Research, U. of California, Berkeley.
RESULTS OF COMPUTATIONS MADE FOR DASA-USNRDL FALLOUT SYMPOSIUM, by R. R. Read, L. F. Wagner and others. Rept. on Contract CD-SR-58-40. Nov 62, 79p. 7 refs. Rept. no. CDRP-182-113.

DESCRIPTORS: *Radioactive fallout, Mathematical analysis, Clouds, Wind; Climatic factors, Tables, Conferences

The regression techniques introduced by the Civil Defense Research Project for estimating fallout particles deposition coordinates, their standard ellipses, and iso-intensity contours have been applied to some of the home-work problems assigned for the DASA-USNRDL Fallout Symposium. The results are reported and the estimates are contrasted with estimates based on the assumption that winds are invariant with time. (Author)

CEX-61.4 OTS $2.25

Edgerton, Germeshausen and Grier, Inc., Las Vegas, Nev.
EXPERIMENTAL EVALUATION OF THE FALLOUT RADIATION PROTECTION PROVIDED BY SELECTED STRUCTURES IN THE LOS ANGLES AREA, by Z. G. Burson. Rept. on Contract AT(29-1)1183. [1962] 117p. 34 refs.

FOOD, HANDLING, AND PACKAGING EQUIPMENT

Food

PB 181 506 OTS $3.00

Advisory Board on Military Personnel Supplies, National Research Council, Washington, D. C.
RADIATION RESEARCH. PROCEEDINGS OF AN INTERNATIONAL CONFERENCE, U. S. ARMY NATICK LABORATORIES, NATICK, MASSACHUSETTS JANUARY 14-16, 1963 SPONSORED BY U. S. ARMY NATICK LABORATORIES, U. S. ARMY MATERIEL COMMAND, ed. by Frank R. Fisher. 1963, 192p. 380 refs.

DESCRIPTORS: *Food, Preservation, Radioactivity, *Radioactive isotopes, *Japan, *Germany, *France, Dosimeters, *Dose rate, Organic compounds, *Radiochemistry, *Radiolysis, Gases, *Paramagnetic resonance, Electrons, *Electron beams, *Ultraviolet radiation, Radiation damage.

Contents:
Technical session no. 1
Welcome remarks
Radioisotopes--their varied uses
Radiation research in Japan
The United States program on radiation preservation of foods
Technical session no. 2
Food irradiation research in Western Germany
Chemical dosimetry at high dose rates
Some aspects of the radiation chemistry of organic compounds
Pulse radiolysis: fast reaction studies in radiation chemistry
Technical session no. 3
Radiation chemistry of gases
Radiation chemistry in the solid state as studied with electron paramagnetic resonance
Radiochemistry in France
Three dimensional dose distribution in samples irradiated by electron beams
Technical session no. 4
The mechanism of ultraviolet and high energy radiation damage
Radiation in biological systems
Radiation preservation of foods--two decades of research and development
Wholesomeness of irradiated food
Appendix
Freedom from hunger.

OTS SB-403 Suppl. 1 $0.10

Office of Technical Services, Dept. of Commerce, Washington, D. C.
FOOD PRESERVATION BY IRRADIATION. Apr 63, 8p. 45 refs. OTS Selective Bibliography SB-403, suppl. 1.

DESCRIPTORS: *Bibliographies, *Food, *Preservation, *Radiation effects, Pasteurization, Disinfectants, Storage.

Lists 45 domestic and foreign references added to the OTS collection from June 1962 through April 1963. Cites references to information on sterilization, pasteurization, wholesomeness, containers and packaging, storage life, and food irradiation facilities. Included are facts on modifications of flavor, color, odor, and texture.

MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT

Manufacturing Equipment and Processes

PB 181 473 OTS $1.00

Office of Technical Services, Dept. of Commerce, Washington, D. C.
GOVERNMENT-OWNED INVENTIONS AVAILABLE FOR LICENSE ACCUMULATED JANUARY 1962 THROUGH DECEMBER 1962. [1963] 138p. 1380 refs. Patent Abstract Series, suppl no. 5.

DESCRIPTORS: United States government, *Patents, *Inventions, *Bibliographies, Instrumentation, Chemicals, Food, Metals, Machines, Transports, Electrical equipment, Electronic equipment, Ordnance, Ceramic materials, Paper, Rubber, Textiles, Wood, Materials.

Supplements in one volume all volumes of the previous series, PB 111 464-PB 111 470, Dec 53, PB 111 854, Jan 54-June 55, PB 151 506-PB 151 512, June 55-June 58, and PB 171 672-PB 171 678, July 58-Dec 60.

For each invention the title of the invention, the United States Patent number, the name of the inventor, the name of the Government agency administering the patent, and an abstract of the patent of the invention are given. Evaluation of the invention with respect to its industrial applications is facilitated by an examination of the technical data contained in the abstract.

Engines and Propulsion Systems

AD-261 133 OTS $18.50

Air Force Flight Test Center, Edwards AFB, Calif.
THEORETICAL JET PUMP PERFORMANCE OF SOME COMMON AND UNCOMMON ROCKET PROPELLANTS, VOLUME I, by R. N. James, R. F. Sawyer, and Forrest Geiger. June 61, 291p. 9 refs. AFFTC-TR-61-35.

DESCRIPTORS: Pumps, *Jet pumps, Liquid rocket propellants, Fluid flow, Jet mixing flow, Fluid mechanics, Theory, Mathematical analysis, *Fuel pumps, Design, Feasibility studies

One stage, vapor driven jet pumps using the propellant as the driving fluid are investigated with the intent of demonstrating their feasibility for use as rocket propellant pumping devices. With the aid of an IBM 704 computer, the effects of driver initial conditions, driver vapor quality, mass flow ratio, mixing pressure, tank pressure, and pumped propellant temperature on the delivered pressure are considered for several common and uncommon rocket propellants, both cryogenic and non-cryogenic. Results are presented in graphical form for each propellant separately, in graphical form comparing the propellants, and in tabular form indicating the overall experimental efficiencies required for bootstrap operation. Finally a correlation factor is presented which allows estimation of the performance of propellants not investigated in this study. (Author)

AD-261 138 OTS $21.00

Air Force Flight Test Center, Edwards AFB, Calif.
THEORETICAL JET PUMP PERFORMANCE OF SOME COMMON AND UNCOMMON ROCKET PROPELLANTS, VOLUME II, by R. N. James, R. F. Sawyer, and Forrest Geiger. June 61, 392p. AFFTC-TR-61-35.

DESCRIPTORS: Pumps, *Jet pumps, Liquid rocket propellants, Fluid flow, Jet mixing flow, Fluid mechanics, Theory, Mathematical analysis, *Fuel pumps, Design, Feasibility studies

See also AD-261 133

NASA N63-12513 OTS $3.60

Lewis [Research Center, National Aeronautics and Space Administration] Cleveland, Ohio.
CASCADE INVESTIGATION OF COOLING CHARACTERISTICS OF A CAST-FINNED AIR-COOLED TURBINE BLADE FOR USE IN A TURBOPROP ENGINE, by Francis S. Stepka, Hadley T. Richards, and Robert O. Hickel. 12 June 57, declassified 14 Sep 62. 33p. 19 refs. Research memo. RM E57D19; supersedes NASA N62-64322.

NASA N63-12529 OTS $1.00

Lewis [Research Center, National Aeronautics and Space Administration] Cleveland, Ohio.
PERFORMANCE OF A SHORT TURBOJET COMBUSTOR WITH HYDROGEN FUEL IN A QUARTER-ANNULUS DUCT AND COMPARISON WITH PERFORMANCE IN A FULL-SCALE ENGINE, by Robert Friedman, Carl T. Norgren, and Robert E. Jones. 2 July 56, declassified 1 Dec 62, 36p. 11 refs. Research memo RM E56D16.

NASA N63-12528 OTS $0.75

Lewis [Research Center, National Aeronautics and Space Administration] Cleveland, Ohio.
PERFORMANCE OF A SINGLE FUEL-VAPORIZING COMBUSTOR WITH SIX INJECTORS ADAPTED FOR GASEOUS HYDROGEN, by Jerrold D. Wear and Arthur L. Smith. 30 Nov 59, declassified 1 Dec 62, 23p. 4 refs. Research memo RM E55I14.

NASA N63-12527 OTS $0.50

Lewis [Research Center, National Aeronautics and Space Administration] Cleveland, Ohio.
SIMPLIFIED THEORY FOR DYNAMIC RELATION OF RAMJET PRESSURES AND FUEL FLOW, by Herbert G. Hurrell. 21 Oct 57, declassified 1 Dec 62, 20p. 6 refs. Research memo RM E57I13.

Transport, Traction and Hoist Facilities

PB 163 103 OTS $9.10

Army Transportation Combat Development Group, Fort Eustis, Va.
DETERMINATION OF REQUIREMENTS FOR UTILIZATION OF CARGO. Final rept. Jan 60, 107p. 13 refs. Project CD 58-7; AD-239 457.

DESCRIPTORS: *Cargo, Specifications, Transportation, Handling, Logistics, *Military transportation, Military operations, Economics, Costs, Shipping, Containers, Transports.

Cargo unitization offers a number of operational and economic advantages, to include increased terminal handling speed and efficiency, reduced loss and damage in transit, reduced overpack requirements, greater ease in cargo identification, documentation and routing. Military cargo unitization experience is confined largely to peace time operations, but the advantages mentioned should accrue also in time of war. (Author)

TID-7651 OTS $5.00

Atomic Energy Commission. Div. of Technical Information Extension, Oak Ridge, Tenn.
AEC SYMPOSIUM ON PACKAGING AND REGULATORY STANDARDS FOR SHIPPING RADIOACTIVE MATERIALS [HELD IN GERMANTOWN, MARYLAND] DECEMBER 3-5, 1962. Dec 62, 423p. 34 refs.

PB 163 137 OTS $2.60

[Institute of Science and Tech.] U. of Michigan Ann Arbor].
A COMPARISON OF REAL AND SIMULATED AUTOMOBILE SUSPENSION SYSTEMS, by R. D. Jeska. Rept. on Contract DA 20-018-ORD-12087. Feb 53, 21p. Rept. no. UMM-117; AD-16 782.

DESCRIPTORS: *Vehicles, *Passenger vehicles, Motion, Acceleration, Vibration isolators, *Suspension devices, Models (Simulations), *Analog systems, Circuits

The experiment was designed to predict the exact motion and acceleration of an automobile driven over a given set of discontinuities and road bumps. The validity of a suspension system simulation on an electromechanical analog computer was determined by comparison with accelerometer tests on an actual suspension system. A conventional coupled-mass simulation was made in which linearized spring constants and shock absorber coefficients were used. Agreement was obtained between the accelerometer and simulator data. It was concluded that the simulator provides design data at least as good as that obtained from the accelerometers. (DDC abstract)

AD-285 136 OTS $2.60

Aerojet-General Corp., Azusa, Calif.
RESIN SYSTEMS FOR FILAMENT-WOUND PRESSURE HULL STRUCTURES, by I. Petker and D. H. Eilfort. Quarterly progress rept. no. 2, 1 Apr-30 June 62, on Contract NObs 86307. Aug 62, 27p. Rept. no. 0611-01-2. AD-285 136.

DESCRIPTORS: *Filament wound construction, *Ship hulls, *Pressure vessels, *Resins, Phenolic resins, *Epoxy resins, *Composite materials, Semipermeability, Laminates, Glass textiles, Reinforcing materials, Polymers, Copolymerization, Amines, Water, Hydrostatic pressure, High pressure research, Stresses, Shear stresses, Tensile properties, Elasticity, Mechanical properties, *Compressive properties.

Fourteen chemically different polymers were incorporated into formulations and cured with a variety of amine and anhydride curing agents. The chemical structure of the basic polymers, the chemical composition of each formulation, and the mechanical properties of these formulations are given. The resin system exhibiting the highest compressive yield strength was based on the diglycidyl ether of resorcinol when cross-linked with an aromatic amine. The compressive yield strength of this system was 24,460 ± 200 psi. Subjecting the resin systems to a high postcure temperature enhanced their compressive properties. An experimental design to determine the relation of compressive yield strength, compressive modulus, and interlaminar shear strength to optimum composite performance was submitted. Data obtained is to be analyzed by standard multiple regression techniques. An experiment to determine the permeability of resin systems to water at 5000 psi pressure was initiated. Preliminary data giving percentage weight gain of resin specimens after immersion times of one day and one week are given. (Author)

AD-289 687 OTS $3.60

Aerojet-General Corp., Azusa, Calif.
RESIN SYSTEMS FOR FILAMENT-WOUND PRESSURE HULL STRUCTURES, by I. Petker and D. H. Eilfort. Quarterly progress rept. no. 3, 1 July-30 Sep 62, on Contract NObs 86307. Nov 62, 33p. Rept. no. 0611-01-3.

DESCRIPTORS: *Filament wound construction, *Ships hulls, *Pressure vessels, *Resins, *Composite materials, Laminates, Polymers, Stresses, Shear stresses, Hydrostatic pressure, High pressure research, Water, Semipermeability, Aging, Heat treatment, Glass textiles, Casting, Impregnation, Wire winding machines.

A discussion of the program and an outline of the work is given. Test results from a study of the effect of high postcure temperature on compressive yield strength resin systems are given. Results of a water permeability study are given for both resin castings and composite structures; these results include percentage weight gain of immersed specimens, horizontal shear strength data, and compressive yield strength data. Several resin systems were tested for resin shear strength as an additional property to characterize these systems; the results of these tests are reported here. A discussion of the work accomplished, to date, on the fabrication of 6-in.-dia cylinders is presented. (Author)

AD-275 260 OTS $3.60

Armour Research Foundation, Chicago, Ill.
AN INVESTIGATION OF THE MATERIAL PARAMETERS INFLUENCING CREEP AND FATIGUE LIFE OF FILAMENT WOUND LAMINATES, by J. W. Dally and H. R. Nelson. Quarterly rept. no. 1 (Rept. no. 2). 26 Jan-26 Apr 62, on Contract NObs-86461. May 62, 38p. 1 ref. ARF Proj. K251.

DESCRIPTORS: *Filament wound construction, *Laminates, Epoxy resins, Polymers, Esters, Reinforcing materials, Glass, *Glass textiles, Mechanical properties, Creep, *Fatigue (Mechanics), Hydrostatic pressure, Stresses, Underwater, Test equipment, Pressure vessels, High pressure research.

The objective of the program is to study the behavior of glass reinforced filament wound plastics when subjected to compressive states of stress. Specifically, the program consists of two phases, the first of which covers the creep and fatigue behavior of the material under uniaxial compressive stress. The second phase pertains to the creep and fatigue behavior of filament wound cylinders in biaxial compression. After first establishing the general characteristics of the creep and fatigue effects in composite materials under compressive state of stress, the investigation will be redirected toward a study of the material parameters which influence their physical properties. The ultimate goal of the program will entail the development of a composite reinforced laminate which will exhibit a compressive strength of 150,000 psi, a compressive modulus of 10×10^6 psi, and a density of 0.08 lbs/in.^{3}. This material must exhibit a high endurance limit and a low creep rate when subjected to stresses produced by hydrostatic pressures comparable to those encountered with deep diving vehicles. (Author)

AD-272 982 OTS $4.60

DeBell and Richardson, Inc., Hazardville, Conn.
MATERIALS STUDY, HIGH STRENGTH, HIGH MODULUS FILAMENT WOUND DEEP SUBMERGENCE STRUCTURES, by William J. Eakins and Carl B. Smedberg. Progress rept. no. 1, 25 Apr-25 Sep 61, on Contract NObs-84672. 6 Oct 61, 50p. 12 refs.

DESCRIPTORS: Underwater, Structures, *Filament wound construction, Laminates, Bonding, Chemical bonds, *Resins, Glass textiles, Reinforcing materials, Plastics, Glass, Quartz, Ceramic fibers, Surface properties, Chemical impurities, Diffusion, Epoxy resins, Chlorides, Methyl radicals, Alkoxy radicals, *Silanes, Test equipment, Physical properties, Cylindrical bodies, Deflection, Marine engineering, Materials.

The application of resin-bonded continuous filament structures under high external stresses, such as required for submergence use. An understanding of the interaction of the resin, resin-glass interface and the glass fiber itself in this composite structure is required. The critical area is near radical differences in the deflection of materials as loads are applied. This area is known as the glass-resin interface and includes a slight distance into the glass and resin phases as well as the boundary area containing the coupling agents to bond the resin and the glass. The report has three major divisions: Glass Surface Studies, Physical Testing Development, and Resin and Resin-Finish Bond Studies. Work contemplated to complete this program will have as its objective the establishment of the mechanisms of interaction between the glass and resin at the interface and the search for materials and methods of application that will minimize the early initiation of failure in this area. (Author)

AD-272 983 OTS $6.60

DeBell and Richardson, Inc., Hazardville, Conn.
MATERIALS STUDY, HIGH STRENGTH, HIGH MODULUS FILAMENT WOUND DEEP SUBMERGENCE STRUCTURES, by William J. Eakins, Richard A. Humphrey, and Kenneth A. Brooks. Progress rept. no. 2, 25 Sep 61-25 Jan 62, on Contract NObs-84672. 1 Feb 62, 66p. 9 refs.

DESCRIPTORS: Materials, Marine engineering, *Filament wound construction, Laminates, Underwater, Structures, Bonding, Chemical bonds, *Resins, *Glass textiles, Reinforcing materials, Plastic, Glass, Quartz, Ceramic fibers, Surface properties, Chemical impurities, Diffusion, Epoxy resins, Chlorides, Methyl radicals, Alkoxy radicals, *Silanes, Test equipment, Physical properties, Tensile properties, Deflection, Shear stresses.

To obtain information to relate failure in the finish-glass faces to the reactivity at the glass surface, the investigation by acid-base titration technique was continued and now includes the heat soaking, mild acid leaching and application of a coupling agent to E glass, A glass and two high modulus glasses to compare with silica fiber. Results indicate that after the application of an alkoxy silane, many finish-reactive sites were not covered by the silane. A formulation of high modulus glass, now in a development stage, is quite unstable to hydrolysis in mildly acid solutions (pH 5.1-6.5), while another formulation of high modulus glass has a stability between E glass and silica. The heat soaking and acid leaching of the various glasses tend to reduce the surface reactivity of the glass.

AD-275 788 OTS $2.60

DeBell and Richardson, Inc., Hazardville, Conn.
MATERIALS STUDY, HIGH STRENGTH, HIGH MODULUS FILAMENT WOUND DEEP SUBMERGENCE STRUCTURES, by William J. Eakins. Progress rept. no. 3, 25 Jan-31 May 62, on Contract NObs-84672. 4 June 62, 26p. 4 refs.

DESCRIPTORS: *Filament wound construction, *Composite materials, *Epoxy resins, Resins, Reinforcing materials, Fibers (Synthetic), *Glass textiles, Mechanical properties, Shear stresses, Structure, Underwater, *Laminates, Ceramic fibers, Silicon compounds, Dioxides, Chemical impurities, Aluminum, Surface properties, *Silanes, Colorimetric analysis

High purity silica filament strand: At Al impurity quantities approaching 0.015%, the aluminum ions are largely separate from the silicate structure, will move from the interior to the surface under heat to 1100°F and are readily leached from that surface in mildly acidic solutions. At considerably lower percentage impurity, estimated at 0.002% or less, the aluminum is almost all tied into the silicate structure. On heating

this silica to 1100°F the aluminum ions are dehydrated and under acid leaching conditions, hydrate and pass very slowly into solution than when not tied into the silicate structure. 6" dia. NOL hoop studies: Interlaminar shear and flexural modulus studies of cuttings show the value of the prepreg resin combination with Eglass. It is particularly superior in modulus and strength retention when an amino (long chain alkyl) silane is applied to the glass. Higher flexural modulus may be obtained with certain more rigid laminating resins. (Author)

NASA N63-15303 OTS $1.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
AN EXPERIMENTAL INVESTIGATION OF SEVERAL ABLATION MATERIALS IN AN ELECTRIC-ARC-HEATED AIR JET, by Andrew J. Chapman, Apr 63, 39p. 13 refs. Technical note D-1520

NASA N63-13789 OTS $0.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
STRENGTH OF FILAMENTARY SHEETS WITH ONE OR MORE FIBERS BROKEN, by George W. Zender and Jerry W. Deaton. Mar 63, 9p. 2 refs. Technical note D-1609.

AD-274 023 OTS $2.60

Narmco Industries, Inc., San Diego, Calif.
OPTIMUM FILAMENT DIAMETER, by W. H. Otto and S. Dharmarajan. Quarterly rept. no. 1, 1 Jan-Apr 62, on Contract NObs-86347. 30 Mar 62, 23p. 6 refs.

DESCRIPTORS: *Glass textiles, *Filaments, Processing, Mechanical properties, Coatings, Sea water, Laminates, Cylindrical bodies, *Filament wound construction, Buckling, Optics, Pressure vessels, Submarine hulls, Underwater equipment, Structures, Glass, Tensile properties

Satisfactory fiber forming conditions were achieved for E-glass monofilament from 0.0004" to 0.010" diameter. Tensile strength as a function of fiber diameter was determined over this range for both uncoated and epoxy resin-coated fibers before and after immersion in sea water. The relations of density and modulus to fiber diameter were also determined over the full range of diameter investigated. The time function of strength was studied on uncoated fibers for load durations up to one week. Engineering analyses on the relationships of fiber diameter to compression strength of the composite were initiated. (Author)

AD-294 108 OTS $2.60

Narmco Industries, Inc., San Diego, Calif.
OPTIMUM FILAMENT DIAMETER, by N. Brink. Quarterly progress rept. no. 4, 1 Oct-31 Dec 62, on Contract NObs-86347. 31 Dec 62, 21p.

DESCRIPTORS: *Filament wound construction, *Filaments, *Glass textiles, *Reinforcing materials, *Composite materials, Rings, Laminates, Elasticity, Manufacturing methods, Stresses, Fibers, Tests, Resins, Tables, Glass.

First tests have been made on the circumferentially wound cylinders in order to check out the test system and determine the initial composite modulus of the laminate. The average composite modulus for the 5-mil fiber was 8.65×10^6 psi. The pressure facility utilizing surplus naval projectiles is being fabricated and will be used to complete the cylinder tests. (Author)

PB 163 082 OTS $1.60

Stanford Research Inst., Menlo Park, Calif.
ENCAPSULATED AEROSOLS, by John E. Douglas. Quarterly progress rept. no. 1, 1 Apr-30 June 60, on Contract DA 18-108-405-cml-746. 1 July 60, 18p. 2 refs. SRI Proj. SU-3191; AD-240 594.

DESCRIPTORS: *Aerosols, *Coatings, Benzoic acids, Ammonium radicals, Chlorides, *Phthalates, Vapors, Condensation, Acetic acids, *Chemical warfare agents, Butyl radicals, Stability, *Encapsulation

Aerosols of dibutyl phthalate and dioctyl phthalate have been encapsulated with benzoic acid, ammonium chloride, and lauric acid by allowing vapors of the coating material to condense upon the aerosol. The benzoic acid on dibutyl phthalate capsules were stable for only a few hours, probably due to the solubility of these materials. The other capsules appear to be stable indefinitely. (Author)

PB 181 471 OTS $0.50

Williams, Clyde, and Co., Columbus, Ohio.
A PROMISING GOVERNMENT-DEVELOPED BRAKE-FLUID CORROSION INHIBITOR. Rept. on An Evaluation of Commercial Applications, Contract CC 4757. [1963] 13p. 8 refs.

DESCRIPTORS: Hydraulic brakes, *Hydraulic fluids, *Corrosion inhibition, Tests, Glycols, Borax

A double condensate, formed by the reaction between a glycol-borax condensate and 2-butyne-1, 4-diol, may be the long-sought answer to the problem of an "ideal" brake-fluid corrosion inhibitor. The inhibitor gives excellent corrosion inhibition, improved stability and storage properties, good rubber compatibility, increased boiling point, and is soluble in all standard brake fluids. Largely because of its effects in minimizing the staining of copper and brass, it enables some brake fluids that fail to meet government specifications to pass these rigid standards. The inhibitor should be readily adaptable for use in at least seventy-five per cent of the commercial brake fluids marketed today. (Author) (See also PB 181 174)

Ceramics and Refractories

PB 163 090 OTS $2.60

Alfred U., N. Y.
MEASUREMENTS OF THERMAL DIFFUSIVITY AND BIOT'S MODULUS FOR DENSE ALUMINA BETWEEN 1500° AND 1800°C BY AN UNSTEADY-STATE METHOD, by A. E. Paladino, Jr., E. L. Swarts and others. Technical rept. on Contract Nonr-1503(02). 15 Apr 56, 29p. 5 refs. AD-98 567.

DESCRIPTORS: *Refractory materials, *Aluminum compounds, Oxides, *Thermal diffusion, Thermal conductivity, Measurement, Cylindrical bodies

An unsteady-state method has been employed for measuring values of Biot's modulus and thermal diffusivity of pure dense alumina in the temperature range 1500° - 1800°C. Limits were established for the possible range of values of diffusivity, and corresponding values of thermal conductivity were calculated. (Author)

NAA-SR-7654 OTS $0.50

Atomics International, Canoga Park, Calif.
HIGH TEMPERATURE PHASE TRANSFORMATION IN BERYLLIUM OXIDE: THERMAL ARREST MEASUREMENTS, by S. B. Austerman. Rept. on Contract AT(11-1)GEN-8. 15 Feb 63, 18p. 6 refs. NASA N63-13207.

PB 163 127 OTS $1.60

Carborundum Co., Niagara Falls, N. Y.
DEVELOPMENT OF ULTRA REFRACTORY MATERIALS, by Peter T. B. Shaffer. Progress rept. no. 17, 1 Feb-30 Apr 59, on Contract NOrd-17175. 15 May 59, 20p. 2 refs. AD-216 830.

DESCRIPTORS: *Refractory materials, *Zirconium compounds, *Molybdenum compounds, *Tungsten compounds, Borides, Silicides, Oxidation, Thermal stresses, Shock resistance, Rupture, Furnaces, Dilatometers

PB 163 128 OTS $1.60

Carborundum Co., Niagara Falls, N. Y.
DEVELOPMENT OF ULTRA REFRACTORY MATERIALS, by Peter T. B. Shaffer. Progress rept. no. 18, 1 May-31 July 59, on Contract NOrd-17175. 3 Aug 59, 12p. AD-220 141.

DESCRIPTORS: *Refractory materials, *Zirconium compounds, *Molybdenum compounds, *Tantalium compounds, Borides, Silicides, Rupture, Oxidation, Reaction kinetics, Physical properties, Furnaces, Dilatometers

A furnace was constructed in which the moduli of rupture can be measured at temperatures near 2000°C in an inert atmosphere. A dilatometer for measuring thermal expansion coefficients in protective atmospheres was assembled. Operation of the high pressure furnace will be initiated upon receipt of the diaphragm compressor. A $ZrBr_2$-$MoSi_2$ hot-pressed cylinder of low overall density was cut lengthwise to produce a bar from which 6 samples of varying relative densities were cut. These samples, 1/2 x 1/2 x 1/4 in., were polished, dried overnight, and weighed. The samples which were oxidized for 24 hr at 1400°C had calculated densities which varied from 5.53 g/cu cm (90.4% of theoretical density and an oxidation rate of 0.99 mg/sq cm/hr) to 4.76 g/cu cm (77.7% of theoretical density and an oxidation rate of 1.68 mg/sq cm/hr). The samples which were oxidized at 1400°C for 88 hr had a calculated density of 6.12 g/cu cm (100.0% of theoretical density and an oxidation rate of 0.45 mg/sq cm/hr). Runs were also made at 1675° and 1950°C. (DDC abstract) (See also PB 163 127)

PB 163 126 OTS $1.60

High Temperature Materials, Inc., Boston, Mass.
PYROLYTIC CARBIDE DEVELOPMENT PROGRAM. Monthly progress rept. no. 6, 1-30 Sep 60, on Contract NOw-60-0292 (FBM). Sep 60, 12p. AD-244 567.

DESCRIPTORS: *Carbides, *Rocket motor nozzles, *Refractory materials, Guided missiles, *Surface to surface, Hafnium compounds, Chlorides, Methanes, Combustion, Graphite, Deposits, Fuel injectors, Processing

A Mark II high temperature resistance furnace was set up with a He cooled injector and metal chloride boiler containing $TaCl_5$ for injector performance evaluation. A hot injector system was designed with a central core heater to maintain the core injector tube above the metal chlorides sublimation temperature; a water cooling jacket is on the outside of the heater. A Mark I resistance furnace is a companion unit to the Mark II and shares the same power supply, CH_4 and Ar metering systems. The Mark I has a 4-in. I.D. by 8-in. long graphite resistor element; the Mark II has a 3-in. I.D. by 8-in. long element. They can be used for alternate processing of TaC and HfC. The carbide processing system was designed by using the new type injector described above. A hot wire apparatus was completed with the installation of a sight tube in the side of the reaction chamber for measuring wire temperatures. Processing data were obtained on the formation of pyrolytic HfC coatings on Mo wire substrates according to the simplified reaction: $HfCl_4 + CH_4 \rightarrow HfC + 4HCl$. The reaction temperature was varied between 1500°C, and 2100°C, and the pressure was constant (below 1 mm). The lower deposition limit for HfC was 1500°C; appreciable deposition rates were obtained only at 1650°C and higher. Below 1800°C deposited structures consisted of HfC with isolated pyrolytic graphite grains. Above 1800°C, one HfC graphite mixture was obtained. (DDC abstract)

PB 163 088 OTS $1.10

New York U. Coll. of Engineering, N. Y.
STUDY OF THE REACTION RATES BETWEEN REFRACTORY OXIDES AND GRAPHITE, by K. L. Komarek. Quarterly progress rept. no. 1, 15 Sep-15 Dec 58, on Contract AF 33(616)6082. Dec 58, 4p. 2 refs. AD-209 631.

DESCRIPTORS: *Refractory materials, Oxides, *Graphite, Reaction kinetics, *Electric furnaces, *Vacuum furnaces, Design

A preliminary report on the design of a high-vacuum, high-temperature, electric resistor furnace with a water-cooled shell.

PB 163 107 OTS $1.60

New York U. Coll. of Engineering, N. Y.
STUDY OF THE REACTION RATES BETWEEN REFRACTORY OXIDES AND GRAPHITE, by K. L. Komarek and A. Coucoulas. Quarterly progress rept. no. 2, 16 Dec 58-15 Mar 59, on Contract AF 33(616)6082. Mar 59, 16p. 1 ref. AD-215 014.

DESCRIPTORS: *Refractory materials, Oxides, *Graphite, Reaction kinetics, *Electric furnaces, *Vacuum furnaces, Water coolers, Design, Construction

A detailed description is given concerning the design and construction of a high-vacuum, high-temperature electric resistor furnace with a water-cooled shell. (See also PB 163 088)

Fuels, Lubricants, and Hydraulic Fluids

PB 163 136 OTS $8.60

Midwest Research Inst., Kansas City, Mo.
STUDY OF FIRE EXTINGUISHING AGENTS AND PREVENTIVE TECHNIQUES FOR HIGH ENERGY FUELS, by H. H. Young and L. A. Eggleston (U. S. Fire Protection Engineering Service, Inc.). Rept on Contract AF 33(616)5786. May 59, 95p. 26 refs. WADC Technical rept. 59-334; AD-227 965.

DESCRIPTORS: *Fuels, *Boron compounds, *Pentaboranes, *Decaboranes, Combustion, *Fire extinguishers, *Foams, Nitrogen, Carbon dioxide, Exhaust gases, Tests.

HEF-2 (alkyl pentaborane) was burned in a series of laboratory screening and larger scale fire tests of various extinguishing agents. Dry chemical, water spray, carbon dioxide and nitrogen were ineffective. Fuel complexing agents in water spray reduced fire intensity but did not extinguish it. Some loaded stream agents produced a more intense fire. Halogenated vaporizing liquids were found to be dangerously explosive when used against HEF fuels. Conventional mechanical foam applied at 0.25 gpm/sq ft was ineffective. Surface explosions caused by a fuel-water reaction prevented formation of a sealing blanket. The use of inert gas foam bubbling with nitrogen, carbon dioxide, or automobile exhaust gases eliminated these explosions and produced extinguishment at the 0.25gpm/sq ft rate. A few tests with HEF-3 (alkyl decaborane) indicated decreased fuel-water sensitivity and fewer explosions. Extinguishment was secured with 0.25 gpm sq ft of conventional air foam. (Author)

PB 163 148 OTS $2.60

Naval Missile Center, Point Mugu, Calif.
CHEMICAL SAFETY, by Alec L. Fine. 15 July 48, 21p. Memorandum rept. no. 11; ATI-71 540.

DESCRIPTORS: *Rocket propellants, *Safety, Handbooks, Chemicals, Nitric acid, *Oxidizers, *Liquid rocket propellants, Anilines, Furfural alcohols, *Hydrogen peroxides, *Carbon tetrachloride, *Liquefied gases, Oxygen, *Hydrazine hydrate, Handling, Storage, Poisoning, Protective clothing.

This report is a transcript of a series of lectures on the subject of the proper means of handling chemical propellants with maximum safety. The purpose is to summarize the properties, the rules for safe handling and storage, effect and first aid treatment of the chemicals. (Author)

PB 163 144 OTS $8.10

White Sands [Missile Range] N. Mex.
MANUAL OF SAFETY PRECAUTIONS FOR MISSILE PROPELLANTS, by F. D. Mayes. Sep 52, 82p. ATI-166 781.

DESCRIPTORS: *Rocket propellants, *Safety, Handbooks, Storage, Handling, Transportation, *Protective clothing, *Fire safety, Chemical waste, Decontamination, *Oxidizers, Fuels, *Liquid rocket propellants, *Solid rocket propellants.

The manual is for the instruction and guidance of all personnel who supervise the transport, handling, or storage of rocket propellants at White Sands Proving Ground. The manual treats the subject of chemicals and compressed gases utilized in rockets and guided missiles in more detail than is found in published WSPG Safety Memorandums.

Plastics

PB 163 131 OTS $3.60

Midwest Research Inst., Kansas City, Mo.
DEVELOPMENT OF HIGH-TEMPERATURE RESISTANT TRANSPARENT PLASTICS, by Howard W. Christie. Quarterly progress rept. no. 2, 15 July-14 Oct 59, on Contract NOas 59-6137-c. 31 Dec 59, 32p. 4 refs. AD-232 247.

DESCRIPTORS: *Plastics, High-temperature research, *Heat-resistant plastics, Alkoxy radicals, Organoboranes, *Epoxy resins, Stability, *Thermosetting resins, Discoloration, Colors, *Aircraft canopies, Oxidation, Handling, Ethers, Phenols, Vinyl radicals, Cyclohexenes, Cyclohexanes, Anhydrides.

The optimum amount of trimethoxyboroxine for catalytic cure of the diglycidyl ether of bisphenol A was between 4.5 and 5.0 wt-%. This concentration level yielded a cured polymer with a minimum of weight loss at 450°F. The thermal stability of the resin system was better than the stability of resins made from the diglycidyl ether of bisphenol A cured with the boron trifluoride amine complexes. Further work with the saturated cyclic epoxides failed to yield a completely colorless resin. Dicyclopentadiene dioxide and 3, 4-epoxy-6-methylcyclohexylmethyl-3, 4-epoxy-6-methylcyclohexanecarboxylate (DDC) yielded colored resins with hexahydrophthalic anhydride. Trimethoxyboroxine was explosively reactive with vinylcyclohexene dioxide and produced rapid gelation of DDC. Redistilled DDC also produced color after polymerization by trimethoxyboroxine. An apparent relationship existed between the structure of the acid anhydride and the color of the resin produced with the diglycidyl ether of bisphenol A. Hexahydrophthalic, methylendomethylenehexahydrophthalic, and succinic anhydrides yielded colorless or nearly colorless resins. Phthalic, endomethylenetetrahydrophthalic, and maleic anhydrides produced yellow to brown resins even at low curing temperatures. (See also PB 163 130)

PB 163 132 OTS $6.60

Midwest Research Inst., Kansas City, Mo.
DEVELOPMENT OF HIGH-TEMPERATURE RESISTANT TRANSPARENT PLASTICS, by Howard W. Christie. Final rept. 16 Apr-15 Dec 59, on Contract NOas 59-6137-c. 20 Jan 60, 61p. 12 refs. AD-234 900.

DESCRIPTORS: *Plastics, High-temperature research, *Heat-resistant plastics, Alkoxy radicals, Organoboranes, Stability, *Epoxy resins, *Thermosetting resins, Colors, Discoloration, Oxidation, *Aircraft canopies, Handling, Ethers, Phenols, Cyclohexenes, Cyclohexanes, Anhydrides

Several epoxide resin types and catalyst systems were investigated for use in making composite glazing materials for supersonic aircraft. Epoxide resins of the glycidyl ether type and resins based on saturated ring structures were investigated in order to obtain colorless cured polymers. The diglycidyl ether of bisphenol A when reacted with hexahydrophthalic anhydride or methylendomethylenehexahydrophthalic anhydride yielded colorless cured resins. A quaternary amine salt served as an excellent catalyst for these polymerizations at 180°F. The resulting resins were nearly water-white but did not have sufficiently good color stability above 350°F. Trimethoxyboroxine will catalytically cure the diglycidyl ether of bisphenol A to a colorless resin with a polyether structure. This resin had improved resistance to discoloration at 400°F and was the most promising for use in composite canopies. The saturated cyclic epoxides (i. e., dicyclopentadiene dioxide, 3, 4-epoxy-6-methylcyclohexylmethyl 3, 4-epoxy-6-methylcyclohexanecarboxylate, etc.) failed to yield colorless resins with the several anhydrides investigated. (See also PB 163 131)

MATHEMATICS

PB 163 113 OTS $6.60

Columbia U., New York
SOME CONTRIBUTIONS TO THE THEORY OF MARKOV CHAINS, by Cyrus Derman. Technical rept. no. 7 on Contract AF 18(600)442. Mar 54, 66p. 17 refs. [AF] OSR TN-54-66; AD-31 552.

DESCRIPTORS: *Probability, Theory, Real variables, Sequences.

Consideration is given to the statistical regularity properties of a denumerable number of particles, all moving about the states of a Markov chain according to the same transition probabilities. Treatment is given to the related problem of solving a familiar system of equations occurring in the theory of Markov chains. An investigation was made of the problem of obtaining sharper versions of a strong limit theorem that was proved independently by Harris (Tran. Am. Math. Soc. 73, 1952) and Levy (Ann. Sci. Ecole Norm. 68, Sup. 3, 1951). Proofs are presented of some multivariate central-limit theorems applicable to the development of asymptotic distribution theory which is useful in treating statistical problems involving Markov chains with denumerably many states. The results are essentially an extension of Bartlett's results (Proc. Cambridge Phil. Soc. 47, part 1, 1951) to denumerable chains. The assumption is made that the Markov chain under consideration is irreducible and recurrent. (DDC abstract)

PB 163 120 OTS $5.60

Naval Ordnance Lab., White Oak, Md.
TABLES OF CHAPLYGIN FUNCTIONS, by Max M. Munk and George Rawling. 26 June 50, 57p. 5 refs. Rept. no. NOLM 10816.

DESCRIPTORS: Tables, *Special functions, Gas flow, Potential theory.

The main body of this report is a collection of tables of certain functions occurring in the computations, by means of the hodograph method, of plane two-dimensional flows of perfect gases. The functions given in the table are closely related to either the stream function in the physical plane, or to the Legendre reciprocal potential function in the hodograph plane. The stream function and the reciprocal potential function depending on the velocity components are designated by the generic title of "Chaplygin functions."

AD-273 278 OTS $1.60

Stanford Electronics Labs., Stanford U., Calif.
HILBERT TRANSFORMS, DISTRIBUTIONAL THEORY, by R. W. Newcomb. Rept. on Contract Nonr-225(24). Feb 62, 15p. 22 refs. Technical rept. no. 2250-1; SEL-62-029.

DESCRIPTORS: *Integral transforms, *Distribution theory, Complex variables, Differential equations, Functions, Matrix algebra, Amplifiers, Electrical networks, Theory, Information theory.

The theory of Hilbert transforms of distributions is presented as a justification for calculations made by engineers. The use of distributional Fourier transforms in evaluating Hilbert transforms is illustrated. (Author)

Computing Devices

PB 163 108 OTS $9.60

Cooley Electronics Lab., U. of Michigan, Ann Arbor.
INTRODUCTION TO LINEAR SHIFT-REGISTER GENERATED SEQUENCES, by T. G. Birdsall and M. P. Ristenbatt. Technical rept. no. 90 on Contract DA 36-039-sc-89277, continuation of Contract DA 36-039-sc-63203. Oct 58, 118p. 6 refs. Rept. no. 2262-189-T; AD-225 380.

DESCRIPTORS: Digital computers, Computer systems components, *Sequences, Polynomials, Matrix algebra

Maximal and non-maximal sequences of linear, shift-register generators are considered. The mathematical formulations necessary to deal with these sequences are treated. Matrix theory is used to prove necessary theorems while the theory of algebraic polynomials and their factors is used to determine the properties of sequences from a given generator. For a given number of stages, the number of available maximal generators is considered. Two methods for finding the proper connections of these maximal generators are described. The second method determines all the proper connections if one is known. For non-maximal generators, the determination of the number of sequences, and the lengths of these sequences, from a given generator is treated. In addition, the shift-and-add properties of both maximal and non-maximal sequences are discussed. (Author)

PB 163 135 OTS $2.60

Laboratories for Applied Sciences, U. of Chicago, Ill.
MATERIALS AND TECHNIQUES FOR INFORMATION STORAGE, by H. Betz, J. Burns and others. Rept. for 5 Jan-31 Dec 60, on Contract AF 33(616)6061. Jan 61, 29p. 3 refs. Rept. no. LAS-TR-P188-10; WADD Technical rept. 60-925; AD-251 219.

DESCRIPTORS: *Data storage systems, *Materials, Storage, *Video signals, Electron bombardment, Fluorescence, Europium

A search is made for materials and techniques that might serve as basis for information storage systems where the information to be stored is a wide-band video signal. An analysis of sequences of processes that make up a recording system is made, and it is indicated how the realization of any proposed system is contingent upon the discovery of materials with special properties. It is proposed that electron-bombardment-induced alteration in fluorescence properties can be used for recording. A preliminary study is made of the fluorescence of europium containing salts and the effect of electron bombardment thereon. (Author)

NASA N63-12312 OTS $2.25

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
A CENTRAL FACILITY FOR RECORDING AND PROCESSING TRANSIENT-TYPE DATA. Jan 63, 81p. 1 ref. Technical note D-1320.

PB 163 100 OTS $13.00

Moore School of Electrical Engineering, U. of Pennsylvania, Philadelphia.
COMMON PROGRAMMING LANGUAGE TASK, PART I, by S. Gorn, J. Crozier and others. Final rept. vol. 4, 1 May 58-30 June 59, on Project ADAR, Task D, Contract DA 36-039-sc-75047. 31 July 59, 184p. 19 refs. AD59URI, Vol. 4, Task D; AD-236 997.

DESCRIPTORS: *Programming languages, Programming (Computers), Data processing systems, Digital computers, *Coding, Machine translation

The Common Programming Language Task is concerned with liaison with various contractors for the FIELDATA system, and with research and development of common programming languages and translation systems for them. The research and development work falls into two areas. First there is the pure study of mechanical languages as such, and secondly, the study of the design of a general translating system which can operate on mechanical languages. The translating system developed is the Automatic Code Translator System (ACT). Indications on how such a system can be used for business data processing languages are given. (Author)

PB 163 097 OTS $3.60

Moore School of Electrical Engineering, U. of Pennsylvania, Philadelphia.
INTRODUCTION TO THE AUTOMATIC CODE TRANSLATION SYSTEM, by William J. Turanski and Anatol W. Holt. Rept. on Remington Rand Univac Div., Sperry Rand Corp. Subcontract to Contract DA 36-039-sc-75047. [1959] 34p. 6 refs.

DESCRIPTORS: *Computer programs, *Machine translation, Programming (Computers), *Data processing systems, Design.

Topics include: Existing automatic programming techniques; FIELDATA requirements; code-to-code translation; the ACT system; over-all organization of ACT; and, considerations governing ACT system design.

AD-284 376 OTS $2.60

National Aeronautical Establishment (Canada).
A POLYNOMIAL SURFACE-FITTING PROGRAM FOR THE BENDIX G-15 DIGITAL COMPUTER, by N. V. McEachern. 22 May 62, 23p. 4 refs. Aeronautical rept. LR-347; N. R. C. no. 6949.

DESCRIPTORS: *Programming (Computers), Digital computers, Polynomials, Matrix algebra.

A Bendix G-15 digital computer program has been written to fit a surface $z = f(x, y)$ through a number of given ordinates erected on an xy-grid - specifically to determine the coefficients a_{st} of the polynomial $z = \sum_{s=0}^{S} \sum_{t=0}^{T} a_{st} x^s y^t$. While the method described is applicable to polynomials of any size, the program was written to deal with six cases (particular values of S and T) which can be accommodated by the G-15 internal memory. The program is written in Intermap, an interpretive matrix algebra coding system, but does not require Intermap programming experience for its use. (Author)

OTS SB-473, suppl. 1 OTS $0.10

Office of Technical Services, Dept. of Commerce, Washington, D. C.
COMPUTER RELATED RESEARCH. Feb 63, 25p. 369 refs. OTS Selective Bibliography SB-473, suppl. 1.

DESCRIPTORS: *Bibliographies, *Computers, *Medical research, Behavior, Cybernetics, Bionics, *Artificial intelligence, *Pattern recognition, Speech, Identification, Reading machines, Teaching machines, *Adaptive control systems

Lists 369 domestic and foreign references added to the OTS collection during the period September 1961 through February 1963. The material is arranged in the following categories: medical and behavioral research, cybernetics and bionics, artificial intelligence, speech and character recognition, reading and teaching machines, adaptive control systems. Covers research on bioelectronics in medicine and human engineering, monitoring and analysis of physiological responses, computer evaluation of clinical data, electro-physiological research, automated instruction, pattern recognition, computer simulation of learning, recognition of speech by machine among other subjects.

OTS SB-472 Suppl. 1 $0.10

Office of Technical Services, Dept. of Commerce, Washington, D. C.
COMPUTERS. Feb 63, 37p. 808 refs. OTS Selective Bibliography SB-472, suppl. 1.

DESCRIPTORS: *Bibliographies, *Computers, *Digital computers.

Lists 808 reports and translations on Computers added to the OTS collection during the period September 1961 to February 1963. Covers research on digital and other computers, high-speed computer research, computer reliability studies, computer programming, applications to mathematics, word coding techniques for computers, computer aided engineering designs, computers in automation and industrial planning among other subjects.

MECHANICS

PB 163 145 OTS $2.60

[Army Cold Regions Research and Engineering Lab., Hanover, N. H.].
TENSILE STRENGTH PROPERTIES OF ICE ADHERING TO STAINLESS STEEL, by H. H. G. Jellinek. Jan 57, 27p. 14 refs. Research rept. 23.

DESCRIPTORS: *Ice, *Adhesion, Tensile properties, Loading (Mechanics), Thickness, Temperature, Stresses, Statistical analysis, Geometric forms, *Stainless steel.

Tensile strength measurements on ice cylinders adhering to stainless steel have been made as a function of rate of loading, thickness and cross-sectional area of specimens, and temperature. The conclusion reached is that the tensile strength is a statistical function of the volume and cross-sectional area of the specimens due to imperfections. Superimposed on to the statistical effect is a stress distribution effect, which becomes predominant for large volumes.

NASA N63-15393 OTS $0.50

Astro Research Corp., Santa Barbara, Calif.
ON ISOMETRIC DEFORMATION OF SCREW SURFACES, by G. W. Schindler. Rept. on Contract NASr-8. May 63, 14p. 3 refs. ARC R-72; NASA N63-12656; Technical note D-1918.

NASA N63-15323 OTS $1.00

Illinois U., Urbana.
ON THE FLOW STRUCTURE WITHIN A CONSTANT PRESSURE COMPRESSIBLE TURBULENT JET MIXING REGION, by W. L. Chow and H. H. Korst. Rept. on Grant NsG-13-59. Apr 63, 33p. 11 refs. NASA Technical note D-1894.

AD-277 165 OTS $5.60

Institute of Aerophysics, U. of Toronto (Canada).
AN EXPERIMENTAL INVESTIGATION OF THE BEHAVIOR OF STIFFENED PLATES IN AXIAL COMPRESSION, by R. C. Tennyson. Sep 61, 54p. 9 refs. UTIA Technical note no. 57; NASA N62-13307.

DESCRIPTORS: *Metal plates, *Buckling, Reinforced flanges, Stresses, Deformation, Mechanical properties, Theory, Configuration, Photoelastic materials, Plastics, Composite materials, Tests, Test equipment, Strain gages, Tensiometers, Aluminum alloys.

An experimental study has been made of the buckling and post-buckling behaviour of a number of flat and curved panels. The effect of the ratio of plate-to-stringer stiffness on the initial buckling stress was determined and the theory of Seide and Stein was found to predict the behaviour of flat panels accurately. The ratio of the ultimate strength of a curved stiffened plate to that of a corresponding flat panel was found to increase with the ratio of panel width to radius of curvature. This increase was found for all values of stiffener-to-plate stiffness ratios. Further, as this stiffness ratio was reduced below a certain critical value, the ultimate strength of a stiffened curved plate, relative to a flat panel, increased rapidly. (Author)

NASA N63-13949 OTS $1.25

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
EFFECTS OF AIR CONTENT AND WATER PURITY ON LIQUID TENSION AT INCIPIENT CAVITATION IN VENTURI FLOW, by Robert S. Ruggeri and Thomas F. Gelder. Mar 63, 46p. 7 refs. Technical note D-1459.

NASA N63-13283 OTS $0.75

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
A NUMERICAL SOLUTION OF THE PROBLEM OF MIXING OF LAMINAR COAXIAL STREAMS OF GREATLY DIFFERENT DENSITIES - ISOTHERMAL CASE, by Herbert Weinstein and Carroll A. Todd. Feb 63, 27p. 7 refs. Technical note D-1534.

NASA N62-17063 OTS $2.60

New York U. Coll. of Engineering, N. Y.
CALIBRATION EXPERIMENTS WITH A TETRAHEDRAL-TYPE PRESSURE APPARATUS, by Philip Adler and Harold Margolin. Rept. on Grant NsG-90-60. [1962] 29p. 5 refs.

PB 163 147 OTS $3.60

Polytechnic Inst. of Brooklyn, N. Y.
THE DETERMINATION OF THE HYDROSTATIC BUCKLING PRESSURES FOR CIRCULAR CYLINDRICAL SHELLS REINFORCED WITH RINGS, by V. L. Salerno and Bernard Levine. Rept. on Contract N6onr-26303. Feb 51, 31p. 3 refs. PIBAL rept. no. 182; ATI-123 876.

DESCRIPTORS: *Structural shells, *Cylindrical bodies, Airframes, Submarine hulls, Structural parts, *Reinforcing materials, *Rings, *Hydrostatic pressure, Buckling.

A simplified formula for the "hydrostatic buckling pressure parameter" Φ_e has been developed. This parameter is used to determine the hydrostatic buckling pressure for an infinitely long, circular cylindrical shell reinforced by evenly spaced elastic rings of equal strength. It also applies to a short circular cylindrical shell whose ends are supported by rings which can twist and bend out of their planes but which are infinitely rigid in their planes. It is shown that the parameter Φ_e can be expressed in terms of the parameters Φ_{SS} and Φ_{RS}, which are limiting values corresponding to a simply supported shell and a rigidly clamped shell. (Author)

NASA N63-12561 OTS $1.00

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
HEAT TRANSFER TO BLUNT AXIALLY SYMMETRIC BODIES, by John O. Reller, Jr. Sep 60, declassified 25 Oct 62, 40p. 14 refs. Technical memo X-391.

NASA N63-14588 OTS $0.50

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
AN INVESTIGATION OF FLOW VISUALIZATION TECHNIQUES IN HELIUM AT MACH NUMBERS OF 15 AND 20, by Charles E. Duller. Apr 63, 18p. 8 refs. Technical note D-1769.

AD-297 895 repriced OTS $1.00

Harry Diamond Labs., Washington, D. C.
FLUID AMPLIFICATION. 5. JET ATTACHMENT DISTANCE AS A FUNCTION OF ADJACENT WALL OFFSET AND ANGLE, by Sheldon G. Levin and Francis M. Manion. 31 Dec 62, 33p. 6 refs. Rept. no. TR-1087; NASA N63-13624.

DESCRIPTORS: *Jets, Fluid mechanics, Subsonic flow, Boundary layer, Surfaces, Computers, Mathematical analysis, Theory, Turbulent boundary layer, Fluid flow.

Attachment of a submerged, incompressible, two-dimensional, turbulent jet to an adjacent straight wall (Coanda effect) is analyzed. Parametric equations are developed that predict the point at which the jet attaches as a function of wall angle and offset distance. Computer solutions were obtained for several sets of conditions. Experiments were conducted with both air and water jets at Mach 0.5 equivalent, and results agree well with corresponding computer solutions when the jet spread parameter is also treated as a function of offset distance and wall angle. The equations provide an analytic method, independent of the particular fluid, for predicting the attachment distance, and should be helpful in designing elements based on the Coanda effect; e.g., the fluid flip-flops or bistable elements. (Author)

NASA N63-13180 OTS $2.25

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
LARGE-SCALE WIND-TUNNEL TESTS OF A CIRCULAR PLAN-FORM AIRCRAFT WITH A PERIPHERAL JET FOR LIFT, THRUST, AND CONTROL, by Richard K. Greif and William H. Tolhurst, Jr. Feb 63, 97p. 7 refs. Technical note D-1432.

NASA N63-15345 OTS $1.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
A 6-INCH SUBSONIC HIGH-TEMPERATURE ARC TUNNEL FOR STRUCTURES AND MATERIAL TESTS, by Ronald D. Brown and L. Ross Levin, Apr 63, 33p. 13 refs. Technical note D-1621.

NASA N63-13562 OTS $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
AERODYNAMIC CHARACTERISTICS AT A MACH NUMBER OF 6.77 OF A 9°CONE CONFIGURATION, WITH AND WITHOUT SPHERICAL AFTERBODIES, AT ANGLES OF ATTACK UP TO 180° WITH VARIOUS DEGREES OF NOSE BLUNTING, by Luther Neal, Jr. Mar 63, 25p. 19 refs. Technical note D-1606.

NASA N63-15235 OTS $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
AERODYNAMIC CHARACTERISTICS OF A FLEXIBLE-CANOPY PARAGLIDER MODEL AT A MACH NUMBER OF 4.5 FOR ANGLES OF ATTACK TO 360° AND SIDESLIP ANGLES FROM 0° TO 90°, by Dewey E. Wornom and Robert T. Taylor, Apr 63, 26p. 7 refs. Technical note D-1776.

NASA N63-12501 OTS $1.75

Langley Research Center, National Aeronautics and Space Administration, Langley [Station] Va.
AERODYNAMIC CHARACTERISTICS OF SOME FAMILIES OF BLUNT BODIES AT TRANSONIC SPEEDS, by Lewis R. Fisher, Arvid L. Keith, Jr., and Joseph R. Di Camillo. Nov 58, declassified 1 Dec 62, 64p. 5 refs. NASA MEMO 10-28-58L, formerly NASA N62-70050.

NASA N63-13716 OTS $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
AERODYNAMIC DRAG AND STABILITY CHARACTERISTICS OF TOWED INFLATABLE DECELERATORS AT SUPERSONIC SPEEDS, by John T. McShera, Jr. Mar 63, 24p. 6 refs. Technical note D-1601.

NASA N63-13756 OTS $1.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
AN ANALYSIS OF THE DELTA-WING HYPERSONIC STABILITY AND CONTROL BEHAVIOR AT ANGLES OF ATTACK BETWEEN 30° AND 90°, by David E. Fetterman and Luther Neal, Jr. Mar 63, 59p. 25 refs. Technical note D-1602.

NASA N63-13181 OTS $1.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
THE BENDING-MOMENT DISTRIBUTION OF CAMBERED-SPAN WING SYSTEMS HAVING MINIMUM INDUCED DRAG, by Clarence D. Cone, Jr. Mar 63, 32p. 2 refs. Technical note D-1505.

NASA N63-13718 OTS $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
EFFECT OF CROSS-SECTION SHAPE ON THE AERODYNAMIC CHARACTERISTICS OF BODIES AT MACH NUMBERS FROM 2.50 TO 4.63, by Dennis E. Fuller, David S. Shaw, and Donald L. Wassum, Mar 63, 31p. 5 refs. Technical note D-1620.

NASA N63-13185 OTS $1.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
EXPERIMENTAL INVESTIGATION OF BLAST LOADING ON AN AIRFOIL IN MACH NUMBER 0.7 AIRFLOW WITH INITIAL ANGLE-OF-ATTACK CHANGE OF 20°, by Harold B. Pierce and James C. Manning. Feb 63, 38p. 11 refs. Technical note D-1603.

NASA N63-13791 OTS $0.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
EXPERIMENTAL INVESTIGATION OF THE DYNAMIC STABILITY OF A TOWED PARAWING GLIDER MODEL, by Robert E. Shanks. Mar 63, 15p. 2 refs. Technical note D-1614.

NASA N63-13186 OTS $1.25

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
EXPLORATORY INVESTIGATION OF THE EFFECT OF A FORWARD-FACING JET ON THE BOW SHOCK OF A BLUNT BODY IN A MACH NUMBER 6 FREE STREAM, by David J. Romeo and James R. Sterrett. Feb 63, 46p. 12 refs. Technical note D-1605.

NASA N63-13986 OTS $1.00

Langley [Research Center, National Aeronautics and Space Administration, Langley Station] Va.
FREE-FLIGHT INVESTIGATION AT TRANSONIC SPEEDS OF THE STABILITY CHARACTERISTICS OF A TAILLESS MISSILE CONFIGURATION HAVING A 45° SWEPTBACK WING OF ASPECT RATIO 4, by Richard G. Arbic. 28 Aug 56, declassified 5 June 62, 38p. 6 refs. Research memo RM L56E11.

NASA N63-10534 OTS $1.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
HEAT TRANSFER AND PRESSURE DISTRIBUTIONS ON A HEMISPHERE-CYLINDER AND A BLUFF-AFTERBODY MODEL IN METHANE-AIR COMBUSTION PRODUCTS AND IN AIR, by Irving Weinstein Dec 62, 32p. 7 refs. Technical note D-1503.

NASA N63-12647 OTS $0.50

Langley [Research Center, National Aeronautics and Space Administration, Langley Station] Va.
HEAT TRANSFER IN REGIONS OF SEPARATED AND REATTACHED FLOWS, by Davis H. Crawford and Charles B. Rumsey. 10 June 57, declassified 25 Oct 62, 14p. 10 refs. Research memo RM L57D25b.

NASA N63-14589 OTS $1.25

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
LOW-SPEED WIND-TUNNEL INVESTIGATION OF AN ANNULAR-JET CONFIGURATION IN GROUND PROXIMITY, by James H. Otis, Jr. and Kenneth W. Goodson, Apr 63, 47p. 6 refs. Technical note D-1779.

NASA N63-13261 OTS $1.25

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
MEASURED AND CALCULATED SUBSONIC AND TRANSONIC FLUTTER CHARACTERISTICS OF A 45° SWEPTBACK WING PLANFORM IN AIR AND IN FREON-12 IN THE LANGLEY TRANSONIC DYNAMICS TUNNEL, by E. Carson Yates, Jr., Norman S. Land and Jerome T. Foughner, Jr. Mar 63, 44p. 12 refs. Technical note D-1616.

NASA N63-15389 OTS $1.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
MEASUREMENTS OF FLOW ANGLES IN VICINITY OF TWO LIFTING FOREBODY CONFIGURATIONS AT A MACH NUMBER OF 2.01, by Odell A. Morris and Francis E. McLean. May 63, 39p. 5 refs. Technical note D-1640.

NASA N63-13516 OTS $0.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
OFF-DESIGN AERODYNAMIC CHARACTERISTICS AT MACH NUMBERS 1.61 AND 2.20 OF A SERIES OF HIGHLY SWEPT ARROW WINGS DESIGNED FOR MACH NUMBER 2.0 EMPLOYING VARIOUS DEGREES OF TWIST AND CAMBER, by Wilbur D. Middleton and Russel B. Sorrells, Mar 63, 20p. 3 refs. Technical note D-1630.

NASA N63-13717 OTS $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
POSTBUCKLING EFFECTS ON THE FLUTTER OF SIMPLY SUPPORTED RECTANGULAR PANELS AT SUPERSONIC SPEEDS, by Robert W. Fralich, Mar 63, 31p. 16 refs. Technical note D-1615.

NASA N63-14252 OTS $2.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
PRESSURE DISTRIBUTIONS ON THREE RIGID WINGS SIMULATING PARAWINGS WITH VARIED CANOPY CURVATURE AND LEADING-EDGE SWEEP AT MACH NUMBERS FROM 2.29 TO 4.65, by Paul G. Fournier. Apr 63, 112p. 10 refs. Technical note D-1618.

NASA N63-12553 OTS $1.00

Langley Research Center, National Aeronautics and Space Administration, Langley [Station] Va.
STATIC LONGITUDINAL AERODYNAMIC CHARACTERISTICS OF SEVERAL WING AND BLUNT-BODY SHAPES APPLICABLE FOR USE AS REENTRY CONFIGURATIONS AT A MACH NUMBER OF 6.8 AND ANGLES OF ATTACK UP TO 90°, by Jim A. Penland and William O. Armstrong. Oct 59, declassified 1 Dec 62, 41p. 15 refs. Technical memo X-65, formerly NASA N62-71889.

NASA N63-12557 OTS $0.50

Langley Research Center, National Aeronautics and Space Administration, Langley [Station] Va.
STATIC LONGITUDINAL STABILITY CHARACTERISTICS OF A BLUNTED GLIDER REENTRY CONFIGURATION HAVING 79.5° SWEEPBACK AND 45° DIHEDRAL AT A MACH NUMBER OF 6.2 AND ANGLES OF ATTACK UP TO 20°, by Edward E. Mayo. Oct 59, declassified 1 Dec 62, 17p. 3 refs. Technical memo X-222, formerly NASA N62-72046.

NASA N63-10950 OTS $1.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
TIME-DEPENDENT AIR FORCES ON WINGS WITH SUPERSONIC LEADING AND TRAILING EDGES AND SUBSONIC SIDE EDGES WITH APPLICATION TO A WING DEFORMING HARMONICALLY ACCORDING TO A GENERAL POLYNOMIAL EQUATION, by Joseph A. Drischler. Dec 62, 63p. 21 refs. Technical note D-1475.

AD-282 309 OTS $2.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
ELECTROMAGNETIC STUDIES OF IONIZED WAKES, by E. L. Murphy, S. Edelberg, and G. F. Pippert. Rept. on Contract AF 19(604)7400. 20 Apr 62, 27p. 14 refs. Technical rept. no. 266; NASA N62-14782.

DESCRIPTORS: *Pellets, *Hypersonics, *Wake, *Ions, *Electromagnetic waves, *Microwaves, Measurement, Analysis, Hypervelocity projectiles, Probes (Electromagnetic).

During the hypervelocity ballistic range experiments, data on ionized trails behind hypersonic pellets have been obtained in three ways: microwave horns to measure the electromagnetic complex reflection and transmission coefficients for the region of trail illuminated by the horn, microwave cavities designed to measure the complex admittance of the portion of the trail within the cavity, and double Langmuir probes to measure local plasma density. The three methods of measurement and the corresponding analysis for reduction of data are described. A model is adopted for the ionized region which makes it possible to relate the electromagnetic parameters to quantities such as electron density, collision frequency, and their space and time distributions. These quantities are related to flow and thermodynamic variables. Cylindrical trails with uniform and radially varying dielectric properties have been treated theoretically; both are described here. However, only the uniform case has been used when reducing the microwave horn data. The UHF cavity data have been reduced on the basis of a complex dielectric post, axially uniform within the cavity. The double Langmuir probe data have been reduced conventionally to obtain ion densities from probe current; this requires knowledge of the local ion temperature, or an assumption for its value.

AD-281 808 OTS $2.60

National Aeronautical Establishment (Canada).
ON THE INFLUENCE OF THE NON-UNIFORM FREE-STREAM OF A CONICAL WIND-TUNNEL NOZZLE ON THE AXISYMMETRIC HYPERSONIC FLOW AROUND BLUNT BODIES, by S. B. Brendt. Feb 62, 29p. 10 refs. Aeronautical rept. LR-338; N.R.C. no. 6814.

DESCRIPTORS: *Wind tunnel nozzles, *Blunt bodies, Axially symmetric flow, Shock, Deformation, Gas flow, Hypersonics, Mathematical analysis, Theory, Bodies of revolution, Conical nozzles, Hypersonic flow.

The constant-density approximation is used to estimate the influence of free-stream non-uniformity on shock stand-off distance and other stagnation region data for round-nosed and flat-faced bodies of revolution. In addition, the deformation of the shock beyond where it leaves the body surface is calculated on the basis of the free shock-layer approximation. The effects are seen to be small but not necessarily negligible in the stagnation region, and there is an indication that they will increase considerably further downstream. (Author)

SC-4752(RR) OTS $0.50

Sandia Corp., Albuquerque, N. Mex.
A STUDY OF VELOCITY PROFILES IN THE MOMENTUM INTEGRAL METHOD WITH SLIP BOUNDARY CONDITIONS, by K. J. Touryan. Rept. on Contract AT(29-1)789. Feb 63, 15p. 8 refs. NASA N63-13502.

SC-4764(RR) OTS $1.25

Sandia Corp., Albuquerque, N. Mex.
TURBULENT MIXING OF AXISYMMETRIC COMPRESSIBLE JETS (IN THE HALF-JET REGION) WITH QUIESCENT AIR, by R. C. Maydew and J. F. Reed. Rept. on Contract AT(29-1)789. Mar 63, 54p. 32 refs. NASA N63-14202.

METALLURGY

ATL-A-128 OTS $2.75

Advanced Technology Labs., Mountain View, Calif.
DEVELOPMENT OF HIGH-STRENGTH TERNARY AND QUATERNARY THORIUM, URANIUM BASE ALLOYS, by R. H. Cole and L. E. Wilkinson. Rept. Final. 1 Nov 62, 156p. 12 refs.

Included in the rept. is:
Tensile testing results, A. Stress-rupture testing results, B. Rept. on Contract AT(04-3)250.

USBM-U-1001 OTS $0.50

Albany Metallurgy Research Center, Ore.
METALLURGICAL PROGRESS REPORT NO. 17. Quarterly rept., 1 Oct-31 Dec 62, on Contract AT(11-1)599. 22p. NASA N63-14294.

NASA N62-16623 OTS $2.60

Battelle Memorial Inst., Columbus, Ohio.
INVESTIGATION OF MECHANICAL PROPERTIES OF CHROMIUM, CHROMIUM-RHENIUM, AND DERIVED ALLOYS, by A. Gilbert, B. C. Allen and others. Quarterly progress rept. no. 9, 1 Mar-1 June 62, on Contract NASw-101. 4 July 62, 26p. 16 refs.

NASA N63-12380 OTS $1.60

Battelle Memorial Inst., Columbus, Ohio.
INVESTIGATION OF MECHANICAL PROPERTIES OF CHROMIUM, CHROMIUM-RHENIUM, AND DERIVED ALLOYS, by A. Gilbert, B. C. Allen and others. Quarterly progress rept. no. 11, 1 Sep-30 Nov 62, on Contract NASw-101. [1962] 13p. 10 refs.

BMI-1616 OTS $1.00

Battelle Memorial Inst., Columbus, Ohio.
INVESTIGATION OF THE YIELD PHENOMENON IN ZIRCALOY-2 AT ELEVATED TEMPERATURES, by Frederic R. Shober, Ralph W. Getz and others. Rept. on Contract W7405-eng-92. 14 Feb 63, 40p. 13 refs. NASA N63-13574.

PB 163 143 OTS $6.60

Climax Molybdenum Co. of Michigan, Detroit.
ARC-CAST MOLYBDENUM-BASE ALLOYS, by John L. Ham. Annual rept. no. 1 on Contract N8onr-78700. 1 Apr 50, 69p. 32 refs. ATI-86 651.

DESCRIPTORS: *Heat resistant metals and alloys, Molybdenum castings, *Molybdenum alloys, Melting, Hardness, Carbon alloys, Beryllium alloys, Boron alloys, Nitrogen, Magnesium alloys, Aluminum alloys, Silicon alloys, Calcium alloys, Titanium alloys, Vanadium alloys, Chromium alloys, Manganese alloys, Iron alloys, Zirconium alloys, Niobium alloys, Cobalt alloys, Nickel alloys, Tantalum alloys, Tungsten alloys, Uranium alloys, Metallography, Chemical analysis.

A preliminary survey was made of the biuary alloys of molybdenum in order to determine which alloys previded the greatest possibility of improving the mechanical properties of molybdenum for service as a structural material at elevated temperatures. The selection of the alloying elements was based on a thorough review of literature and previous experience. The elements employed were Be, B, C, N, Mg, Al, Si, Ca, Ti, V, Cr, Ma, Fe, Co, Ni, Zr, Cb, Ta, W, and U. Experimental procedures and apparatus used in the survey are described. Summary and comparison of the effects of the various alloying elements are given, and metallographic techniques and procedures for chemical analysis for molybdenum and molybdenum-base alloys are discussed. (Author)

AD-299 516 repriced OTS $1.50

Columbia U., New York.
INFLUENCE OF RESIDUAL STRESSES ON RANDOM FATIGUE LIFE, IN BENDING, OF NOTCHED 7075 ALUMINUM SPECIMENS, by R. A. Heller, M. Seki, and A. M. Freudenthal. Summary rept., 1 Aug 60-31 Aug 62, on Metallic Materials, Contract AF 33(616)7042. Dec 62, 57p. 20 refs. ASD TDR-62-1075; NASA N63-14649.

DESCRIPTORS: *Fatigue (Mechanics), *Aluminum, Aluminum alloys, Plasticity, Stresses, Tensile properties, Mechanical properties, Mathematical analysis, Theory, Experimental data

Theoretical and experimental results of investigations conducted to determine the effects of residual stresses on fatigue damage accumulation and fatigue life under both constant amplitude and randomized exponential stress distributions, of 7075-T6 circumferentially notched rotating bending specimens are presented. The variation of the strength reduction factor as a function of prestress and load spectrum is examined. An approximate analysis of the elastic-plastic stress distribution at the minimum cross section is suggested on the basis of which fatigue behavior can be predicted. The results indicate that the linear (Miner) cumulative damage rule quite generally overestimates fatigue lives except in the alternating plasticity range and that the endurance limit is considerably reduced as a result of stress interaction, provided that in the application of the linear damage rule the S-N-diagram for the prestressed specimen is used. In the range of alternating plasticity at the root of the notch $10^3 < N < 10^4$ the linear rule consistently underestimates the fatigue life. (Author)

AD-263 702 OTS $2.60

Hammond Metallurgical Lab., Yale U., New Haven, Conn.
THE MECHANISM OF HYDROGEN EMBRITTLEMENT OBSERVED IN IRON-SILICON SINGLE CRYSTALS, by A. S. Tetelman and W. D. Robertson, Technical rept. no. 3 on Contract Nonr-609(28). Sep 61, 30p. 23 refs.

DESCRIPTORS: *Single crystals, *Iron alloys, Silicon alloys, *Hydrogen embrittlement, Plasticity, Deformation, Lattices, Crystal structure, Fracture (Mechanics), Stresses.

The technique of decorating dislocations was employed to investigate plastic deformation and fracture resulting from precipitation of hydrogen in iron-3% silicon single crystals. It is shown that cracks are produced on [100] planes inside crystals quenched from a hydrogen atmosphere at elevated temperatures or cathodically charged with hydrogen at room temperature. Plastic deformation in the vicinity of cracks, observed as arrays of decorated dislocations, is in conformity with previously calculated stress distributions about a crack containing an internal pressure. The fracture characteristics of crystals containing internal cracks were evaluated at 25°C and -196°C and the results are related to the mechanism of hydrogen embrittlement. (Author)

HW-70607 OTS $2.60

Hanford Atomic Products Operation, Richland, Wash.
THE IMPACT PROPERTIES OF UNALLOYED PLUTONIUM, by H. R. Gardner. Rept. on Contract AT(45-1)1350. Oct 61, 16p. 1 ref.

HW-76228 OTS $2.75

Hanford Atomic Products Operation, Richland, Wash.
METALLURGY RESEARCH OPERATION. Quarterly progress rept. Oct-Dec 62, on Contract AT(45-1)1350. 15 Jan 63, 154p. 37 refs. NASA N63-13954.

NASA N63-14402 OTS $0.75

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
CONTINUED INVESTIGATION OF AN ADVANCED-TEMPERATURE, TANTALUM-MODIFIED NICKEL-BASE ALLOY, by John C. Freche and William J. Waters. Apr 63, 31p. 17 refs. Technical note D-1531.

NASA N63-14403 OTS $0.75

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
EFFECT OF OXYGEN ON MECHANICAL PROPERTIES OF TUNGSTEN, by Joseph R. Stephens. Apr 63, 24p. 15 refs. Technical note D-1581.

NASA N63-14405 OTS $0.50

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
INFLUENCE OF FLUORINE ENVIRONMENT ON THE MECHANICAL PROPERTIES OF SEVERAL SHEET ALLOYS, by Hadley T. Richards and Morgan P. Hanson, Apr 63, 15p. 8 refs. Technical note D-1706.

NMI-1248 OTS $2.75

Nuclear Metals, Inc., Concord, Mass.
FUNDAMENTAL AND APPLIED RESEARCH AND DEVELOPMENT IN METALLURGY. CONCEPTUAL DESIGN OF A U-233 FUEL REFABRICATION PLANT, by W. B. Nowak and B. W. Wessling. Summary technical rept. 1 July 60-30 June 61, on Contract AT(30-1)1565. 30 July 62, 181p. 132 refs.

PB 163 125 OTS $1.60

Sintercast Corp. of America, Yonkers, N. Y.
RESEARCH ON HEAT RESISTANT ALLOYS STRENGTHENED AT ELEVATED TEMPERATURES BY INCORPORATION OF FINE PARTICULATE SUBSTANCES, by Eric Gregory and Martin Epner. Interim rept. no. 2, 17 Jan-16 Mar 56, on Contract NOas-56-227-C. 11 Apr 56, 16p. AD-95 136.

DESCRIPTORS: *Powder metallurgy, *Heat resistant metals and alloys, *Chromium alloys, *Nickel alloys, *Dispersion hardening, Particles, *Titanium compounds, Carbides, Sintering, Metallography, Extrusion

In the program for the development of reinforced metal products based on heat-resistant alloys, an investigation into the manufacture or availability of ultrafine powders has continued and meanwhile four extrusion billets, two of which contain fine titanium carbide dispersions, have been produced with the materials available at present. From these it is hoped to obtain information on the extrusion conditions and possibly stress rupture data which will provide a basis for comparison of the effects of the ultrafine dispersions to be added later. (Author)

PB 163 084 OTS $1.60

Sintercast Corp. of America, Yonkers, N. Y.
RESEARCH ON HEAT RESISTANT ALLOYS STRENGTHENED AT ELEVATED TEMPERATURES BY THE INCORPORATION OF FINE PARTICULATE SUBSTANCES, by Eric Gregory. Interim rept. no. 5, 1 July-31 Aug 57, on Contract NOas 57-400-c. Oct 57, 13p. 1 ref. AD-150 940.

DESCRIPTORS: Alloys, *Heat-resistant metals and alloys, Nickel alloys, Chromium alloys, Microstructure, Electron microscopy, Dispersion hardening, Mechanical properties.

The structure of dispersion hardened materials were examined in the extruded condition by means of an electron microscope. All the oxide-containing materials had similar structures, although the stress rupture properties of the various compositions varied appreciably. A TiC specimen was etched in Marble's Reagent and the oxide-containing materials were dipped in 50% HCl after polishing. The results of these experiments indicated that the electron microscope might be a useful tool for the examination of the structure of composite materials. The results were dependent upon the polishing, etching, and general surface preparation of the specimens. (DDC abstract)

PB 163 085 OTS $4.60

Sintercast Corp. of America, Yonkers, N. Y.
RESEARCH ON HEAT RESISTANT ALLOYS STRENGTHENED AT ELEVATED TEMPERATURES BY THE INCORPORATION OF FINE PARTICULATE SUBSTANCES, by Eric Gregory. Summary rept. on Contract NOas-57-400-C. Jan 58, 43p. 4 refs. AD-205 287.

DESCRIPTORS: *Heat resistant metals and alloys, *Nickel alloys, *Chromium alloys, *Cobalt alloys, *Dispersion hardening, Particles, *Thorium compounds, Oxides, Carbides, Borides, Stresses, Rupture, Ductility, Electron microscopy.

The technique previously established for the production of materials of high density consisting of an alloy matrix containing uniform dispersions of hard phase addition agents, was used to produce a range of materials based on 80-20 nickel-chromium and on various cobalt base alloys. The stress rupture properties of materials with both 80-20 nickel-chromium and cobalt alloy matrices and oxide, carbide and boride dispersions were tested at 1800°F; appreciable increases in rupture life over material containing no additions was achieved when the nickel alloy contained 17.5% by volume of ThO_2. Various TiC additions made to 80-20 nickel-chromium and to cobalt base alloy matrices produced stress rupture properties at 1800°F equivalent to those of some of the best wrought high temperature alloys, but their ductility was generally low. Relatively high ductilities both at 1800°F and at room temperature were achieved with 80-20 nickel-chromium materials containing 17.5% by volume of various borides and silicides, but in general these materials did not exhibit the best stress rupture properties at these temperatures Difficulty was experienced in obtaining reproducible results with electron microscopy. (See also PB 163 084)

GEAP-3979 OTS $2.50

Vallecitos Atomic Lab., Pleasanton, Calif.
SPECIFIC ZIRCONIUM ALLOY DESIGN PROGRAM, by H. H. Klepfer, D. L. Douglass, and J. S. Armijo. Quarterly progress rept. no. 1, Feb-June 62, on Contract AT(04-3)189. 1 July 62. EURAEC-422. 123p. 4 refs. NASA N63-13734.

Ferrous Metals

BMI-1621 OTS $1.25

Battelle Memorial Inst., Columbus, Ohio.
ANNEALING STUDIES ON IRRADIATED TYPE 347 STAINLESS, by William E. Murr and Frederic R. Shober. Rept. on Contract W7405-eng-92. 6 Mar 63, 49p. 2 refs. NASA N63-13973.

PB 181 476 OTS $1.50

Illinois U., Urbana.
CRACK PROPAGATION IN LOW-CYCLE FATIGUE OF MILD STEEL, by S. T. Rolfe and W. H. Munse. Progress rept. no. 2 on Low Cycle Fatigue, Contract NObs-77008. 1 May 63, 56p. 67 refs. Ship Structure Committee Serial no. SSC-143.

DESCRIPTORS: *Steel, Metal plates, *Fracture (Mechanics), Measurement, *Strain gages, *Loading (Mechanics), Stresses, Temperature, Aging, *Fatigue (Mechanics).

The investigation reported is concerned with crack propagation in low-cycle fatigue of mild-steel plate specimens and has indicated that during crack propagation the type of loading cycle will affect markedly the fatigue behavior. Several types of reversed loading cycles have been included in the investigation, namely constant load, reduced loads and constant stress. In the constant-load tests the stress increases throughout the test as the crack propagates, and the rate of crack propagation continuously increases. If the load range is reduced throughout a test (reduced-load test) so as to produce constant net-section stresses, the rate of crack growth will decrease throughout the test. In the constant-stress tests the stress range was maintained constant during the test. In this latter use, the rate of fatigue crack propagation remained constant after a short initial period. Constant-stress tests were conducted at stress levels ranging from ± 27 ksi to ± 36 ksi, on 3/4-in. thick specimens with widths of 5 in. and 7 in., at test temperatures of 78 F and -40 F and for both unaged and aged specimens. It was found that the fatigue crack propagation behavior during a constant-stress test may be divided into an initial, linear, and final stage. A hypothesis relating the rate of crack growth and the stress has been developed to describe the behavior during the various stages of propagation. (Author)

PB 163 091 OTS $2.60

Massachusetts Inst. of Tech., Cambridge.
ENERGY CRITERIA OF FRACTURE, by E. Orowan. Technical rept. no. 3 on Contract N5ori-07870. July 54, 22p. 7 refs. D. I. C. no. 6949; AD-39 107.

DESCRIPTORS: *Steel, *Fracture (Mechanics), Loading (Mechanics), Deformation, Mechanical properties, Energy, Elasticity, Stresses, Surface properties, Ship plates

A discussion is presented to show that the Griffith equation $\sigma \approx \sqrt{E\alpha/c}$ represents a necessary and sufficient condition for completely brittle fracture; E is Young's modulus, α is the specific surface energy of the fracture surface, and c is the crack length. Arguments are advanced to show that the Griffith principle dW = -dU can only be applied if plastic deformation is either absent or confined to a thin layer at the crack walls so that the bulk of the specimen is still elastic; dW is the free energy required for increasing the crack length from c to c + dc, and -dU is the elastic energy released simultaneously when the specimen is held between rigidly fixed grips so that external forces cannot do work. The applicability of the crack propagation condition, $\sigma \approx \sqrt{Ep/c}$, for brittle fracture in normally ductile steels is also discussed. This condition is obtained from the Griffith equation by replacing the surface energy α by the plastic surface work p. (ASTIA abstract)

Light Metals

UCRL-6410 OTS $2.60

Lawrence Radiation Lab., U. of California, Livermore.
A FRESH LOOK AT THE PROBLEMS IN BERYLLIUM METALLURGY, by Rointan F. Bunshah. Rept. on Contract W7405-eng-48. 31 Mar 61, 23p. 36 refs.

Y-1403 OTS $0.50

Union Carbide Nuclear Co., Oak Ridge, Tenn.
INSPECTION OF BERYLLIUM CHIPS BY NONFILM RADIATION IMAGING, by R. E. Cofield. Rept. on Contract W7405-eng-26. 16 Nov 62, 21p. 4 refs. NASA N63-14286.

Structural Metallurgy and Corrosion

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Argonne National Lab., Ill.
VISIT TO SOVIET CORROSION CHEMISTRY INSTITUTES, JUNE 25-JULY 4, 1962, by J. E. Draley and F. W. Young, Jr. (Oak Ridge National Lab.). Rept. on Contracts [W7405-eng-26 and W31-109-eng-38]. 15 Mar 63, 24p. 83 refs.

AD-277 904 OTS $13.00

Cornell U., Ithaca, N. Y.
OXIDE NUCLEATION AND GROWTH, by William Harold Orr (Doctoral thesis). Technical rept. no. 5 on Contract Nonr-401(31). 1 Apr 62, 183p. 95 refs.

DESCRIPTORS: *Oxides, *Nucleation, *Magnesium, Oxidation, Reaction kinetics, Grain structures (Metallurgy), Low pressure research, Ionization gages

The purpose of the present investigation was to study the kinetics of the initial stages of the interaction of oxygen with a clean magnesium surface at low temperatures. Efforts were also made to obtain structural information about both the magnesium surface and the oxide formed on it for the purpose of correlating this information with the observed kinetics.

PB 163 109 OTS $3.60

Naval Ordnance Test Station, China Lake, Calif.
THE CORROSION OF METALS BY MOLTEN LITHIUM, by G. DeVries, O. T. Pfefferkorn, and W. O. Wetmore. 10 Mar 51, declassified 25 May 54, 35p. 3 refs. NAVORD rept. 1295; NOTS 365.

DESCRIPTORS: *Metals, *Corrosion, *Lithium, Liquid metals, Tests, High temperature research, Steel, Stainless steel.

This report describes the procedures and results of tests made to determine the resistance of various materials to molten lithium. Sufficient quantitative data were obtained to aid in the selection of materials for handling molten lithium. This report covers the progress to date on this project, but additional data are necessary to complete the study.

PB 163 111 OTS $3.60

[Nepa Div., Fairchild Engine and Airplane Corp., Oak Ridge, Tenn.].
MATERIALS TESTED IN LITHIUM, by R. C. Anderson and H. R. Stephan. Progress rept. Aug 50, declassified 18 Aug 61, 33p. 5 refs. NEPA rept. no. 1652.

DESCRIPTORS: *Lithium, *Corrosion, Metals, Ceramic materials, High-temperature research, Tests, Reactor coolants.

This paper discusses the corrosion of materials by lithium when heated, in contact, to elevated temperatures under static or dynamic conditions. Test temperatures ranged from 900°F. - 2200°F. for test durations of 5-200 hours. The metals molybdenum, tantalum, niobium, titanium, zirconium, nickel, and iron; alloys, consisting of the American Iron and Steel Institute types 304, 347, 321, 316, 309, 310, and 446, along with Inconel and L-605; metal ceramics, metal oxides, nitrides, and carbides [were studied]. Molybdenum appeared to be least affected of all the materials investigated. (Author)

NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

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COMPUTER PROGRAM FOR CALCULATING THE RELATIVE YIELDS OF ISOMERS PRODUCED IN NUCLEAR REACTIONS, by W. L. Hafner, Jr., J. R. Huizenga, and R. Vandenbosch. Rept. on Contract W31-109-eng-38. Dec 62, 61p. 2 refs.

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EXPERIMENTS ON ENHANCED CATALYTIC ACTIVITY FROM INTERNAL IRRADIATION OF CATALYSTS, by James L. McFarling and John F. Kircher. Rept. on Contract W7405-eng-92. 28 Feb 63, 19p. 18 refs. NASA N63-14280.

WAPD-TM-364 OTS $1.75

Bettis Atomic Power Lab., Pittsburgh, Pa.
NUMERICAL METHODS AND TECHNIQUES USED IN THE TWO-DIMENSIONAL NEUTRON-DIFFUSION PROGRAM PDQ-5, by L. A. Hageman. Rept. on Contract AT(11-1)GEN-14. Feb 63, 85p. 24 refs. NASA N63-13934.

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California Research Corp., Richmond.
THE ANALYSIS OF POLYPHENYL RADIOLYSIS PRODUCTS BY GAS CHROMATOGRAPHY AND OTHER METHODS, by W. W. West. Rept. on Contract AT(04-3)248. 22 Oct 62, 39p. 13 refs. NASA N63-13501.

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General Dynamics/Fort Worth, Tex.
NEUTRON AND GAMMA AIR SCATTERING AND AIR SECONDARY TRANSFER FUNCTIONS FOR SHEILDING APPLICATIONS, by C. E. Humphries and N. D. King. Rept. on Contract AF 33(657)7201. 9 Mar 62, 359p. 7 refs. Document no. MR-N-283; Rept. no. NARF-62-1.

DESCRIPTORS: *Neutrons, *Gamma rays, Transport properties, Air, *Inelastic scattering, Neutron capture gamma rays, Gamma neutron reactions, Shielding, Spaceships

To aid in the design of shielded compartments, air transfer functions have been generated for four types of interactions: (1) air scattering of gamma rays, (2) production of gamma rays by capture of neutrons, (3) production of gamma rays by inelastic scattering of neutrons, and (4) air scattering of neutrons. Attenuation through various combinations of neutron and gamma shielding thicknesses is considered in these functions, but gamma production within the shielding is not. (Author)

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Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
THE LOW FREQUENCY POWER SPECTRUM OF COSMIC-RAY VARIATIONS DURING IGY, by David Stern, Mar 63, 21p. 41 refs. Technical note D-1684.

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Lawrence Radiation Lab., U. of California, Berkeley.
HYPERFINE STRUCTURES AND NUCLEAR MOMENTS OF Lu^{176m}, Br^{80}, Br^{80m}, AND I^{132}, by Matthew B. White. Thesis. Rept. on Contract W7405-eng-48. Sep 62, 153p. 62 refs. NASA N63-12939.

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Lawrence Radiation Lab., U. of California, Berkeley.
PHYSICS DIVISION SEMIANNUAL REPORT, May-Oct 62, on Contract W7405-eng-48. 28 Nov 62, 121p. 118 refs. NASA N63-14080.

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FLEXIBLE NEUTRON SHIELDING SYSTEMS BASED ON VINYL PLASTISOLS, by James S. Church and John K. Donahoe. Rept. on Contract W7405-eng-36. 5 Sep 62, 30p. NASA N63-13372.

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THE DECONTAMINATION AND RECOVERY OF PRECIOUS METALS. Quarterly progress rept. 2 July-1 Oct 60 on Contract AT(30-1)2528. Declassified 30 Nov 61. 45p. 8 refs.

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BURNUP DETERMINATION OF NUCLEAR FUELS, ed. by J. E. Rein and B. F. Rider (Vallecitos Atomic Lab., General Electric Co.). Progress rept. for 1962, on Contracts AT(10-1)205 and AT(04-3)189. 15 Jan 63, 25p. 9 refs. Prepared in cooperation with Vallecitos Atomic Lab., General Electric Co.

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EVESR-NUCLEAR SUPERHEAT FUEL DEVELOPMENT PROJECT, by R. T. Pennington. Quarterly rept. no. 1, 4 May-31 Aug 62 on Contract AT(04-3)189. 31 Jan 63, 153p.

GEAP-3967 OTS $0.75

General Electric Co., San Jose, Calif.
HIGH POWER DENSITY DEVELOPMENT PROJECT, 300 MWe HPD CONCEPTUAL DESIGN STUDY, by V. G. Graynek and A. P. Bray. Interim rept. on Contract AT(04-3)189. June 62, 24p. 3 refs.

GEAP-4080 OTS $2.00

General Electric Co., San Jose, Calif.
SODIUM COOLED REACTORS PROGRAM. FAST CERAMIC REACTOR DEVELOPMENT PROGRAM, ed. by F. J. Leitz. Quarterly rept. no. 4, July-Sep 62, on Contract AT(04-3)189. 31 Jan 63, 93p. 14 refs. NASA N63-13736.

GEAP-3811 OTS $2.75

General Electric Co., San Jose, Calif.
SODIUM COOLED REACTORS PROGRAM. FAST CERAMIC REACTOR DEVELOPMENT PROGRAM SUMMARY REPORT, JULY 1959-SEPTEMBER 1961, ed. by F. J. Leitz. Rept. on Contract AT(04-3)189. [1961] Jan 63, 150p. 8 refs.

GEAP-3927 OTS $0.50

General Electric Co., San Jose, Calif.
VBWR IRRADIATION OF REACTOR CONTROL MATERIALS IN TUBES CONTAINING SIMULATED DEFECTS, by F. H. Megerth and D. L. Zimmerman. Rept. on Contract AT(04-3)189. June 62, 20p. 6 refs.

60-GL-73 OTS $2.60

General Electric Co., Schenectady, N. Y.
REPORT OF TESTS TO DETERMINE THE EFFECT OF PLATE LENGTH-TO-WIDTH RATIO ON THE PRESSURE DIFFERENTIALS DEVELOPED ACROSS SINGLE ALUMINUM PLATES DIVIDING A FLOW CHANNEL, by W. L. Zabriskie. Rept. on Contract W31-109-eng-52. 15 Apr 60, 23p. 2 refs.

HW-74549 OTS $1.25

Hanford Atomic Products Operation, Richland, Wash.
FUEL RE-USE: ANALYSIS OF A FAST-THERMAL REACTOR COMPLEX, by R. J. Hennig, P. L. Hofmann, and G. J. Busselman. Progress rept. on Contract AT(45-1)1350. 1 Mar 63, 49p. 10 refs.

HW-75007 OTS $6.00

Hanford Atomic Products Operation, Richland, Wash.
PLUTONIUM AS A POWER REACTOR FUEL, comp. by F. G. Dawson. Proceedings American Nuclear Society Topical Meeting, Richland, Washington, Sep 13-14, 1962. Rept. on Contract AT(45-1)1350. Dec 62, 523p. 214 refs.

HW-76158 OTS $0.50

Hanford Atomic Products Operation, Richland, Wash.
PROTOTYPE BURST TEST UNIT FOR IRRADIATED PRESSURE TUBES, by P. M. Jackson. Rept. on Contract AT(45-1)1350. Jan 63, 16p. NASA N63-14051.

NASA N63-13218 OTS $0.75

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
TWO-DIMENSIONAL CRITICALITY CALCULATIONS OF GASEOUS-CORE CYLINDRICAL-CAVITY REACTORS, by Robert E. Hyland, Robert G. Ragsdale, and Eugene J. Gunn. Mar 63, 29p. 10 refs. Technical note D-1575.

LA-2833 OTS $2.50

Los Alamos Scientific Lab., N. Mex.
LAMPRE I FINAL DESIGN STATUS REPORT. Rept. on Contract W7405-eng-36. Jan 62, 137p. 3 refs.

NYO-9657 OTS $4.00

Massachusetts Inst. of Tech., Cambridge.
SPATIAL DISTRIBUTION OF THE NEUTRON FLUX ON THE SURFACE OF A GRAPHITE-LINED CAVITY, by J. T. Madell, T. J. Thompson and others. Rept. on Contract AT(30-1)2344. Apr 62. MITNE-18. 335p. 21 refs. NASA N63-13561.

DP-812 OTS $1.75

Savannah River Lab., Aiken, S. C.
APPLICATION OF MOISTURE SEPARATORS AND PARTICULATE FILTERS IN REACTOR CONTAINMENT, by Albert H. Peters. Rept. on Contract AT(07-2)1. Dec 62, 68p. 6 refs.

DP-600 OTS $3.50

Savannah River Lab., Aiken, S. C.
FINAL HAZARDS EVALUATION OF THE HEAVY WATER COMPONENTS TEST REACTOR (HWCTR), by L. M. Arnett, D. Randall and others. Rept. on Contract AT(07-2)1. Dec 62, 293p. 38 refs.

GEAP-4017 OTS $2.25

Vallecitos Atomic Lab., General Electric Co., Pleasanton, Calif.
ABSORBER BURN-UP EXPERIMENT, by J. L. Russel, Jr., M. R. Carrothers, and W. V. Mosgovoy. Rept. on Contract AT(04-3)189. Apr 62, 114p. 10 refs. NASA N63-13735.

GEAP-3997 OTS $1.00

Vallecitos Atomic Lab., General Electric Co., Pleasanton, Calif.
EXAMINATION OF 304 STAINLESS STEEL CLADDING FROM COLD-SWAGED AND ROLLED FUEL PODS, by W. V. Cummings, D. R. Lewis, and R. E. Blood. Rept. on Contract AT(04-3)361. July 62, 46p. 6 refs.

GEAP-3771-3 OTS $2.60

Vallecitos Atomic Lab., General Electric Co., San Jose, Calif.
HIGH PERFORMANCE UO_2 PROGRAM, by B. Weidenbaum. Quarterly progress rept. no. 3, Oct-Dec 61 on Contract AT(04-3)189. 2 Jan 62, 29p. EURAEC-277.

GEAP-3983 OTS $0.50

Vallecitos Atomic Lab., General Electric Co., Pleasanton, Calif.
SLOW CYCLE STRAIN FATIGUE IN THIN WALL TUBING, by M. B. Reynolds. Preliminary rept. on Contract AT(04-3)189. 19 July 62, 21p. 6 refs. NASA N63-13496.

GEAP-4060 OTS $1.00

Vallecitos Atomic Lab., General Electric Co., Pleasanton, Calif.
REMARKS CONCERNING MATERIAL FOR NUCLEAR SUPERHEAT FUEL CLADDING, by H. H. Klepfer, D. L. Douglass and others. Rept. on Contract AT(04-3)189. 4 Sep 62, 44p. 23 refs. NASA N63-13498.

WCAP-6051 OTS $2.50

Westinghouse Electric Corp., Pittsburgh, Pa.
POWER DENSITY AND BURNUP DISTRIBUTIONS IN YANKEE CORE I, by J. D. McGaugh and R. H. Chastain. Rept. on Contract AT(30-1)3017. Jan 63, 145p. 24 refs.

Radioactivity

TID-17518 OTS $1.50

Hazleton-Nuclear Science Corp., Palo Alto, Calif.
METEOROLOGICAL EVALUATION OF RADIOACTIVE FALLOUT, by Paul Kruger, Albert Miller, and Charles L. Hosler. Semi-annual rept. on Contract AT(04-3)457. 31 Oct 62. HNS-10. 58p. 13 refs.

LA-2811 OTS $1.25

Los Alamos Scientific Lab., N. Mex.
BETA DECAYS AND DELAYED GAMMAS FROM FISSION FRAGMENTS, by James Griffin. Rept. on Contract W7405-eng-36. Dec 62, 48p. 14 refs. NASA N63-13195.

LA-2765 OTS $2.25

Los Alamos Scientific Lab., N. Mex.
QUANTITATIVE MEASUREMENT OF GAMMA-RAY-EMITTING RADIONUCLIDES IN METEORITES, by M. W. Rowe. Rept. on Contract W7405-eng-36. May 62, 100p. 33 refs. NASA N63-12991.

Waste Disposal

HW-76262 $1.00

Hanford Atomic Products Operation, Richland, Wash.
RESEARCH AND DEVELOPMENT ACTIVITIES. FIXATION OF RADIOACTIVE RESIDUES, by E. R. Irish. Quarterly progress rept. Oct-Dec 62, on Contract AT(45-1)1350. Jan 63, 39p. 9 refs.

IDO-14596 OTS $2.00

Phillips Petroleum Co., Idaho Falls.
DESIGN OF A PILOT PLANT FACILITY FOR RADIOACTIVE DEMONSTRATION OF THE POT CALCINATION PROCESS, by B. R. Wheeler and J. A. Buckham. Rept. on Contract AT(10-1)205. Dec 62, 104p. 29 refs.

PERSONNEL SUPPLIES AND PERSONAL EQUIPMENT

PB 163 076 OTS $5.60

[Quartermaster Research and Engineering Command, Natick, Mass.]
IRAN: ENVIRONMENTAL CONDITIONS AFFECTING LOGISTICS, by Earl E. Lackey. July 51, declassified, 56p. Environmental Protection Section rept. no. 179.

DESCRIPTORS: *Iran, *Logistics, Terrain, Climatology, Military personnel, Clothing, Shelters, Tents, Storage, Water supplies, Food, Fuels, Insects.

The factors of terrain and climate require careful evaluation in relation to clothing, shelter, storage, and other factors pertaining to the efficiency and comfort of combat soldiers. Four clothing groups needed for combat troops in Iran are listed, together with suggestions relative to the time of the year and parts of the country in which each is to be worn. In succeeding sections, brief surveys are given on storage, shelter, insect pests, water supplies, fuel supplies, and food requirements.

PB 163 075-S1 OTS $6.60

[Quartermaster Research and Engineering Command, Natick, Mass.]
STUDIES ON CLOTHING FOR HOT ENVIRONMENTS; DEATH VALLEY, 1950. PART II: ENVIRONMENT, by Norman Sissenwine, Robert Anstey, and Peveril Meigs. June 51, declassified, 63p. 16 refs. Environmental Protection Section rept. no. 178.

DESCRIPTORS: *Desert tests, *Terrain, *Climatology, Temperature, Humidity, Wind, Thermal radiation, Cloud cover, Plants (Botany), Animals, Insects, Meteorology, *Clothing, Military personnel.

This report describes the distinctive geographic and climatic environment under which the desert clothing experiments were carried out, including a day by day record of the gruelling load of heat and solar radiation under which the Quartermaster scientists worked. (See also PB 163 075)

PHYSICS

NASA N63-14430 OTS $1.50

Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
SOME EFFECTS OF SPECTRAL CONTENT AND DURATION OF PERCEIVED NOISE LEVEL, by Karl D. Kryter and Karl S. Pearsons, Rept. on Contract NASr-58. Apr 63, 55p. 15 refs. NASA Technical note D-1873.

AD-271 887 OTS $2.60

California U., La Jolla.
IMAGES OF THE FERMI SURFACE IN PHONON SPECTRA IN METALS, by E. J. Woll, Jr. (Doctoral thesis) and W. Kohn. Technical rept. no. 8 on Contract Nonr-2216(11). Aug 60, 23p. 12 refs.

DESCRIPTORS: *Phonons, Electrons, Metals, Lead, Sodium.

This paper contains semi-quantitative considerations concerning images of the Fermi surface in the phonon spectra of various metals. Anomalies in the phonon dispersion curves, as well as discontinuities of the phonon lifetime, are discussed. (Author)

PB 163 121 OTS $1.60

Graduate Aeronautical Labs., Calif. Inst. of Tech., Pasadena.
A THEORY OF ACOUSTIC FATIGUE, by S. R. Valluri. Rept. on Kinetics of Deformation and Fracture, Contract AF 33(616)6270. July 62, 19p. 7 refs. ARL 62-370, NASA N62-14051.

DESCRIPTORS: *Fatigue (Mechanics), *Acoustics, Theory, *Stresses, Frequency, Statistical functions, Equations, Mathematical analysis, Fracture (Mechanics).

The theory presented here is a formal extension of an engineering theory of fatigue. Representing the result of acoustic input as one of random stress response, expressions are derived for the prediction of time to failure. Indications are that the tail of the distribution function curve associated with the r.m.s. stress amplitude peak at any one particular frequency is of considerable importance in determining the time to failure. It appears that one has to talk of the probability of failure at any instant rather than a specific time to failure. A detailed and rigorous treatment of the random loading aspect of the problem of acoustic fatigue appears to be too complex to be of much use at this time since the first two aspects of the problem are not too well understood. Under these conditions, simplifying assumptions indicate that the probability of failure at any time is directly related to the cumulative probability of the distribution function associated with the r.m.s. stress response. (Author)

UCRL-10404 OTS $0.75

Lawrence Radiation Lab., U. of California, Berkeley.
BIBLIOGRAPHY FOR HINDERED INTERNAL ROTATION AND MICROWAVE SPECTROSCOPY, by D. R. Herschbach. Rept. on Contract W7405-eng-48. Oct 62, 30p. 201 refs. NASA N63-12940.

AD-295 126 OTS $4.60

Wayne State U., Detroit, Mich.
THEORETICAL AND EXPERIMENTAL INVESTIGATIONS OF THE LIGHT SCATTERING OF COLLOIDAL SPHERES, by Wilfried Heller. Technical rept. no. 3(49) on Contract Nonr-3511(00). 15 Nov 62, 46p. 58 refs.

DESCRIPTORS: *Light, *Electromagnetic waves, Sheres, Colloids, Theory, Mathematical analysis, Measurements, Polarization, Spectrographic analysis, Bibliography, Scattering

Contents:
Introduction
Essentials of the theory of scattering by spheres
Formulation of the practically important expressions with emphasis on those derived from the mie theory
Survey of experimental methods (turbidity measurements, scattering measurements at 90 degrees with respect to incident beam, scattering ratio, polarization ratio and depolarization, dissymmetry, forward and backward scattering, angular scanning, spectra)

Electronics

NASA N63-15501 OTS $0.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
DIRECT VELOCITY MEASUREMENTS IN LOW-DENSITY PLASMA FLOWS, by W. D. Beasley, J. D. Brooks, and R. L. Barger, May 63, 12p. 5 refs. Technical note D-1783.

NASA N63-15472 OTS $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
A THEORETICAL STUDY OF THE MOTION OF AN IDEALIZED PLASMA RING THROUGH VARIOUS TRAVELING-MAGNETIC-WAVE PLASMA ACCELERATORS, by Clarence W. Matthews. May 63, 22p. 6 refs. Technical note D-1636.

NASA N63-14805 OTS $1.00

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
EXPERIMENTAL EVALUATION OF A DIRECT-CURRENT LOW-PRESSURE PLASMA SOURCE, by Stanley Domitz, Apr 63, 34p. 16 refs. Technical note D-1659.

LA-2802 OTS $3.00

Los Alamos Scientific Lab., N. Mex.
A STUDY OF THE STABILITY OF A RELATIVISTIC PARTICLE BEAM PASSING THROUGH A PLASMA, by R. C. Mjolsness. Rept. on Contract W7405-eng-36. Oct 62, 233p. 55 refs. NASA N63-13668.

MATT-133 OTS $1.00

Plasma Physics Lab., Princeton U., N. J.
ON THE USE OF MAGNETICALLY COMPRESSED PLASMAS IN A STELLARATOR, by D. L. Dimock, J. M. Dawson, and M. A. Rothman. Rept. on Contract AT(30-1)1238. July 62, 43p. 3 refs. NASA N63-10361.

MATT-152 OTS $1.00

Plasma Physics Lab., Princeton U., N. J.
SOME INVESTIGATIONS OF PLASMA INSTABILITIES IN ONE-DIMENSIONAL PLASMAS, by John Dawson and Craig Smith. Rept. on Contract AT(30-1)1238. Nov 62, 44p. 9 refs. NASA N63-11706.

SC-4776(RR) OTS $0.75

Sandia Corp., Albuquerque, N. Mex.
SPECTROGRAPHIC ANALYSIS OF PLASMAJETS, by K. L. Shipley. Progress rept. no. 2, on Contract AT(29-1)789. Mar 63, 32p. 11 refs. NASA N63-14752.

PB 163 119 OTS $4.60

University Coll., London (Gt. Brit.).
RESEARCH ON EFFECTS OF ELECTRON COLLISIONS IN ATMOSPHERIC GASES, by R. W. Lunt. Technical rept. on Contract AF 61(052)110. 14 Feb 62, 50p. 44 refs. AFCRL-62-1077. N63-13710.

DESCRIPTORS: *Gas discharges, *Electrons, Drift, Gases, Hydrogen, Nitrogen, Oxygen, *Photons, Photomultipliers, *Ultraviolet radiation, Electric discharges, Spectrographic data, Measurement, Scientific research.

Absolute rate coefficients have been measured for the emission of radiation in the spectral ranges above and below 2000 A from low pressure uniform-field d.c. discharges of very low current density in hydrogen, nitrogen and oxygen in the field-to-pressure range 20 to 120 volts cm^{-1} $mm\ Hg^{-1}$. The rate coefficients are given in photons per cm of electron drift motion and per unit gas pressure. Approximate cross sections have been derived for the principal electron-impact reactions with ground state molecules generating the excited species to which the radiation is attributed. (Author)

Molecular Physics and Spectroscopy

PB 163 134 OTS $5.60

Baird[-Atomic] Inc., Cambridge, Mass.
RESEARCH ON TECHNIQUES LEADING TO THE DEVELOPMENT OF A LONG WAVELENGTH INFRARED VIEWER-EVAPOROGRAPH. Final engineering rept. vol. 4, June 50-Dec 54, on Contract AF 33(038)12277. Feb 55, declassified 20 Dec 56, 54p. Rept. no. E-17; AD-62-203.

DESCRIPTORS: *Infrared optical systems, Design, Infrared spectroscopy

This report summarizes the history of development of the Evaporograph AN/AAR-7(XA-1). It is shown how, starting with the design of Czerny, a sensitive and reliable heat-imaging device was designed.. Objects as little as 0.2°C above the ambient can be seen and can resolve 14 lines per mm. In addition to a summary of the previous work the design of an infrared doublet f:1.2 lens is discussed. An experimental study of the effect of contrast on the resolution showed that the sensitivity for targets of low resolution was markedly better than that for for targets of high resolution. The study of the addition of air in the cell indicates that the sensitivity decreases linearly with an increase in air pressure. The rate seems to be about 15% for each hundred microns increase in pressure. This indicates that a sealed cell in which the air pressure can be maintained below 100 microns should operate satisfactorily. (Author)

PB 163 129 OTS $6.60

Ohio State U. Research Foundation, Columbus.
STRUCTURE OF K X-RAY ABSORPTION EDGES OF ARGON AND KRYPTON IN GASEOUS AND SOLID STATE, by J. A. Soules (Doctoral thesis) and C. H. Shaw. Technical rept. no. 2 on Contract N6onr-22521. Oct 54, 64p. 42 refs. RF Proj. 384; AD-55 718.

DESCRIPTORS: *Helium group gases, *Argon, *Krypton, *Solidified gases, *X-ray spectroscopy, Absorption spectrum, Crystals, Quartz, Calcite, Helium, Oxygen, Nitrogen.

An investigation was undertaken to obtain direct energy correlation between the electronic states of an isolated atom and those of the solid crystal. Experiments were performed using A, which has a K absorption edge at 3.86 A. Observations were also made using the krypton 25/7 K absorption edge at 0.87 A. The existence of sharp discontinuities, corresponding to band edges, in the solid spectrum was demonstrated. An attempt was made to correlate the observed absorption minima in the A spectrum with those predicted by Kronig theory (R. Kronig, Z. Physik. 75:191, 1932). The first minimum (α) could not be fitted, but the 3 succeeding minima (β, γ, δ) agree with the predicted strong Kronig minima. Other minima, predicted by the Kronig theory to be weak, were not positively observed. The successive minima in the observed spectrum were at about 11-v spacing, in agreement with the Kronig prediction. The zero of the energy scale for the Kronig lines was set at +2.9 v relative to the ionization energy of the free atom. The absorption spectrum of solid Kr differed from that of A in that the maximum absorption was much less. The Kronig series of absorption minima could not be fitted as well to the Kr spectrum as to that of the A because of the smaller number of observed minima in the Kr spectrum. The 2 minima observed were at about 10-v spacing, in agreement with the Kronig values. (PDC abstract)

Solid State Physics

ANL-6591 OTS $1.00

Argonne National Lab., Ill.
THERMAL EXPANSION OF ALPHA-ZIRCONIUM SINGLE CRYSTALS, by Lowell T. Lloyd. Rept. on Contract W31-109-eng-38. Jan 63, 41p. 9 refs. NASA N63-13065.

RFP-297 OTS $0.50

Dow Chemical Co., Denver, Colo.
COMPUTER PROGRAM TO PERFORM FOURIER ANALYSIS OF X-RAY DATA, by C. L. Bell, A. Goodwin, Jr., and G. R. Mallett. Rept. on Contract AT(29-1)1106. 4 Feb 63, 22p. 1 ref. NASA N63-13026.

GEMP-192 OTS $1.00

General Electric Co., Cincinnati, Ohio.
COMPUTER PROGRAMS DESCRIBING COLLISION CASCADES IN BINARY MATERIALS. I. SQUARE PLANAR LATTICE, by D. G. Besco and J. R. Beeler, Jr. Rept. on Contract AT(40-1)2847. Feb 63, 40p. 5 refs. NASA N63-14651.

PB 163 032 OTS $4.60

Linden Labs., Inc., State College, Pa.
STUDY OF THE DEGRADATION OF HIGH K CERAMIC DIELECTRICS, by W. R. Buessem, S. R. Butler, and P. A. Marshall, Jr. Quarterly rept. no. 6 on Contract DA 36-039-sc-71190. 1 Oct 57, 43p. 5 refs.

DESCRIPTORS: *Ceramic materials, *Dielectrics, *Titanium compounds, Oxides, Degradation, *Crystal lattice defects, Heat of formation, Chemical equilibrium, Enthalpy, Energy, Electrons, Ions.

This report discusses whether the defect electrons associated with anion vacancies are free electrons, i.e., electrons in the conduction band of TiO_2, or whether they are quasi-free electrons associated with the Ti^{4+} ions of the lattice forming Ti^{3+} ions. (See also PB 162 317-4)

WCAP-1655 OTS $5.60

Westinghouse Electric Corp., Pittsburgh, Pa.
AN INVESTIGATION OF MIXED VALENCE THERMOELECTRIC MATERIALS, by J. C. Danko, G. R. Kilp, and H. M. Ferrari. Rept. on Contract AT(30-3)500. Oct 60, 53p.

Thermodynamics

ANL-6660 OTS $0.50

Argonne National Lab., Ill.
THE AXISYMMETRIC FREE-CONVECTION HEAT TRANSFER ALONG A VERTICAL THIN CYLINDER WITH CONSTANT SURFACE TEMPERATURE, by R. Viskanta. Rept. on Contract W31-109-eng-38. Jan 63, 26p. 15 refs. NASA N63-14076.

ANL-6673 OTS $3.50

Argonne National Lab., Ill.
A TABLE OF THERMODYNAMIC PROPERTIES OF HYDROGEN FOR TEMPERATURES FROM 100 TO 300°K AND PRESSURES FROM 1 TO 50 ATMOSPHERES, by Charles E. Cohn and Gerald H. Golden. Rept. on Contract W31-109-eng-38. Jan 63, 267p. 2 refs. NASA N63-13067.

NASA N63-13965 OTS $0.75

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
SUBCOOLED BOILING HEAT TRANSFER UNDER FORCED CONVECTION IN A HEATED TUBE, by S. Stephen Papell, Mar 63, 23p. 14 refs. Technical note D-1583.

AD-283 307 OTS $2.60

National Research Council of Canada, Div. of Mechanical Engineering, Ottawa.
ON THE MEASUREMENT OF THE AVERAGE TEMPERATURE OF A FLUID STREAM IN A TUBE BY MEANS OF A SPECIAL TYPE OF RESISTANCE THERMOMETER, by R. Sandri, R. J. Brisebois, and J. K. S. Wong. Apr 62, 24p. 2 refs. Rept. no. MI-826; N. R. C. no. 6900.

DESCRIPTORS: *Resistance thermometers, *Temperature, Flowmeters, Fluid flow, Quartz, Measurement, Gas flow.

A new type of resistance thermometer, consisting of a platinum wire in a narrow glass or quartz tube bent to a loop of pre-calculated shape, is described. Such a thermometer should give an output proportional to the true average temperature of the fluid stream, provided that the temperature distribution in the flow tube is symmetrical with regard to the axis of the tube. Experiments were carried out to check the performance of these thermometers in an air stream. In a reasonably undisturbed velocity field, the error in the measurement of the average temperature was about 2.5 percent to 5 percent of the horizontal temperature difference across the gas stream. Irregular variations in the turbulent flow pattern set a limit to the accuracy that can be attained. These thermometers should be useful in experiments on spray evaporation and combustion and on chemical reactions proceeding in mixtures of gases or liquids. Under suitable conditions these thermometers, together with an electric heater, can also serve for determining the rate of flow. An accuracy of about 1 percent is possible here. (Author)

Wave Propagation

PB 163 080 OTS $8.10

Antenna Lab., Ohio State U. Research Foundation, Columbus.
MULTIPOLE FIELD EXPANSIONS AND THEIR USE IN APPROXIMATE SOLUTIONS OF ELECTROMAGNETIC SCATTERING PROBLEMS, by E. M. Kennaugh. Rept. on Bi-static Reflection Characteristics, Contract AF 19(604)3501. 1 Nov 59, 83p. 41 refs. Rept. no. 827-5; AFCRC-TN-60-115; AD-231 874.

DESCRIPTORS: *Electromagnetic theory, Electromagnetic waves, *Series, *Electromagnetic fields, *Wave transmission, Propagation, Scattering, Mathematical analysis, *Electromagnetic wave reflections.

The representation of electromagnetic fields by multipole expansions and the use of such expansions in the approximate solution of scattering problems is discussed. The problem of representing solutions of Maxwell's equations in homogeneous isotropic regions is considered. Several methods for obtaining multipole expansions from either a knowledge of the source distribution or the values of the tangential fields over a closed surface, or the field components and all their derivatives at a single point are described. The application of multipole fields in the approximate solution of single-body scattering problems is also discussed. A method which obtains the best approximation to a match of tangential field components at the scatterer surface is described. The case of a perfectly conducting scatterer is considered, and it is shown that the convergence of field-matching techniques can be verified and a bound on the mean square error in the scattered field obtained if a certain inequality can be derived. Such an inequality is derived for a spherical scattering surface. The application of approximate field matching techniques is illustrated for the perfectly conducting prolate and oblate spheroid. (Author)

PB 163 118 OTS $7.60

Frequency Management Directorate, Washington, D. C.
FIELD PROCEDURES FOR COMPUTING HIGH FREQUENCIES FOR COMMUNICATIONS CIRCUITS BASED ON LONG TERM PROPOGATION PREDICTIONS (A SHORT GRAPHICAL METHOD). Jan 61, 78p.

DESCRIPTORS: *Graphic analysis, *High frequency, Radiofrequency, Frequency, *Communication systems, Propagation, Mathematical prediction.

This booklet is provided for use in the field as a ready method for determining an approximation of maximum usable frequency (MUF) and optimum traffic frequency (FOT) data for long term planning purposes. The method used is to guide field communication personnel through a computation process by specifying a series of precise steps which lead to completion of the computation process. Use of the calculation process specified in this booklet will permit basing long term frequency planning upon sound engineering concepts rather than "rule of thumb" considerations.

RESEARCH METHODS, TECHNIQUES AND EQUIPMENT

AD-277 168 OTS $6.60

Institute of Aerophysics, U. of Toronto (Canada).
A HIGH-SPEED MULTI-SOURCE SPARK CAMERA, by J. H. deLeeuw, I. I. Glass, and L. E. Heuckroth. Feb 62, 63p. 15 refs. UTIA Technical note no. 26; NASA N62-13306.

DESCRIPTORS: *High speed cameras, Design, *Spark shadowgraph photography, *Schlieren photography, Shock waves, Blast, Explosions, Detonation waves, Underwater explosions, Fluid flow, Tests, Effectiveness

Some details are given of the design, operation, and applications of an eight-channel Cranz-Schardin type high-speed multiple spark source camera suitable for optical studies of nonstationary flow phenomena in gases and transparent liquids and solids. The camera has been successfully applied to the investigation of cylindrical and spherical explosions and implosions, underwater blasts, stress waves in plastics and impact in glass panels. (Author)

UCRL-Pub-42 OTS $2.75

Lawrence Radiation Lab., U. of California, Berkeley.
STATUS REPORT: FISCAL YEAR 1962. Rept. on Contract W7405-eng-48. 191p. Prepared in cooperation with Lawrence Radiation Lab., U. of California, Livermore.

SOCIAL SCIENCES

Documentation

PB 181 503 OTS $4.00

Office of Science Information Service, National Science Foundation, Washington, D. C.
CURRENT RESEARCH AND DEVELOPMENT IN SCIENTIFIC DOCUMENTATION NO. 11, comp. by Eugene Pronko, Nancy R. Donald, and Mary G. Lewis. Nov 62, 450p. 535 refs. Rept. no. NSF-63-5.

DESCRIPTORS: *Scientific research, Reports, *Documentation, *Information retrieval, *Data storage systems, *Data processing systems, *Machine translation, *Pattern recognition, *Artificial intelligence, *Speech representation, Synthesis, *Philology, *Psychology

Summaries are given of the activities of organizations and individuals engaged in research and development in the following fields: information needs and uses, information storage and retrieval, mechanical translation, data handling equipment, character and pattern recognition, speech analysis and synthesis, linguistic and lexographic research, artificail intelligence, and psychological studies. Bibliographies are included with many of the entries.

OTS SB-475 Suppl. 1 $0.10

Office of Technical Services, Dept. of Commerce, Washington, D. C.
INFORMATION STORAGE AND RETRIEVAL. Apr 63, 25p. 302 refs. OTS Selected Bibliography SB-475 Suppl. 1.

DESCRIPTORS: *Bibliographies, *Documentation, *Data storage systems, *Information retrieval, Subject indexing.

Lists 302 reports and translations added to the OTS collection during the period September 1961 to February 1963. Covers research on various data storage systems, data reduction, documentation, mechanized literature searching, flow of information among scientists, standardization of retrieval language and systems, coordinate indexing, machine association of ideas, machine indexing, machine classification of information and sampled data feedback systems among other subjects.

PB 181 501 OTS $2.75

Rutgers U., New Brunswick, N. J.
AN ANALYSIS OF DUPLICATION AND CONSISTENCY OF SUBJECT INDEXING INVOLVED IN REPORT HANDLING AT THE OFFICE OF TECHNICAL SERVICES, U. S. DEPARTMENT OF COMMERCE, by Ann F. Painter. Doctoral thesis. Rept. on Contract CC-4753. Mar 63, 142p. 66 refs.

DESCRIPTORS: *Documentation, *Subject indexing, Bibliography, Indexes, Catalogs, Reports, Handling, Classification, *Information, Retrieval, Automation, Operations research, Department of Commerce, *Theses

This study was conducted as part of an investigation of the possibilities and practicality of mechanized information and report handling. Two areas in which mechanization has proven feasible have been examined in relation to the OTS operation; the amount and frequency of duplication and the consistency with which subject terms are assigned within several of the systems contributing to OTS. Machine search was found to be feasible at the simplest level of processing (report number or series number). Both manually oriented and machine oriented indexing systems were found to average 60 to 70 per cent consistency within each system, with an equivalency of 30 per cent within the broadest system; a table of equivalents is at present of little value in either a manual or a machine system.

MISCELLANEOUS

PB 181 414 OTS $1.25, $10/year

Naval Research Lab., Washington, D. C.
REPORT OF NRL PROGRESS. June 63.

DESCRIPTORS: *Naval research, *Scientific research, Humidity, Volume, Lithium compounds, Fluorides, Brain, Atmosphere, Astrophysics, Light transmission, Lasers, Ruby, Chemistry, Oils, Additives, Polymers, Solids, Fatty acids, Adsorption, Chemical warfare agents, Gas detectors, Creep, Oxygen, Algae, Submarines, Nuclear propulsion, Mathematics, Programming (Computers), Mechanics, Non-destructive testing, Photoelasticity, Structures, Stresses, Metallurgy, Ceramic materials, Vanadium compounds, Oxides, Zinc compounds, Aluminum, Sintering, Fatigue (Mechanics), Nickel alloys, Palladium alloys, Iron alloys, Chromium alloys Hydrogen, Water vapor, Steel, Heat treatment, Titanium, Titanium alloys, Pressure, Nuclear physics, Spectroscopy, Radio, Electric networks, Atnennas, Germanium, Solid state physics, Phosphorescence, Dosimeters, Beryllium, Reports, Patents

Contents:
Articles:
The NRL Lyman-Alpha Humidiometer, by D. L. Randal T. E. Hanley and O. K. Larison
Dislocation Dipoles Associated with Volume Electrical Breakdown Paths in LiF, by J. W. Davission, W. H. Vaughan, and J. Pasternak

Scientific Program:
Applications Research: Equipment to measure the electrical activity of the brain
Atmosphere and Astrophysics: Transmission of ruby laser light through water
Chemistry: Dynamic surface phenomena in the spontaneous spreading of oils on solids. Effect of polar-nonpolar additives on soil-spreading on solids, with applications to nonspreading oils. Surface activity of fluorinated organic compounds at organic-liquid/air interfaces—part five—the effect of partially fluorinated additives on the wettability of solid polymers. Prevention of liquid spreading or creeping. Behavior of monolayers of progressively fluorinated fatty acids adsorbed on water. Effectiveness of M6A1 detector paper for small airborne drops of CW agents. Study of the feasibility of oxygen production by algae for nuclear submarines
Mathematics: NELIAC-N permits NAREC computer programs to be written in mathematical rather than machine or assembly language
Mechanics: Nondestructive, photoelastic technique for detecting residual stresses in structures
Metallurgy and Ceramics: Proposed phase diagram for the system vanadium pentoxide-zinc oxide. Effect of vacuum on the creep-rupture properties of sintered aluminum and commercial aluminum. Structural changes produced in a fatigued specimen as a function of temperature. Specific heat of nickel-palladium alloys. Hydrogen permeation during the high-temperature oxidation of and Fe-5Cr alloy in water vapor. Heat treatment of irradiated A350-LF1 plate steel for notch ductility recovery. Low cycle fatigue crack propagation. Mechanical properties of titanium and titanium alloys. Effect of pressure on the current flow exhibited by mild steel at various constant potential levels.
Nuclear and Atomic Physics: Stark profile measurement of the Lyman-alpha and Lyman-beta lines of hydrogen
Radio: Combining network allows transmitter multicoupler equipments to be operated into one antenna. Simultaneous contamination and conversion effects in germanium heated to temperatures in the evaporation range
Solid State Physics: "Phosphorescence" method of reading thermoluminescent dosimeters
Supporting Techniques: Soldered Beryllium Windows for Photon Counter Tubes

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